Multidisciplinary Approach to Interstitial Lung Diseases

RISHI RAJ

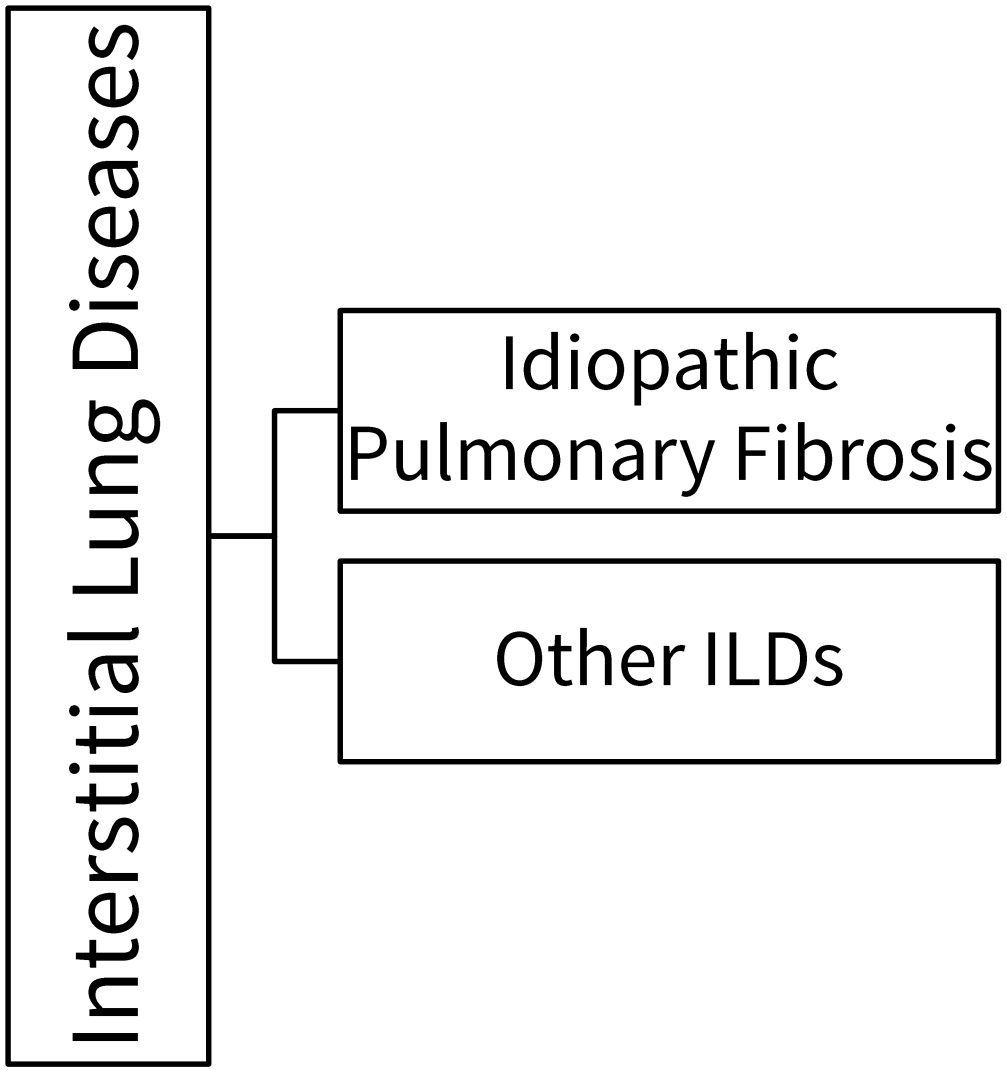
Stanford University

Case Study: Mr. D.S

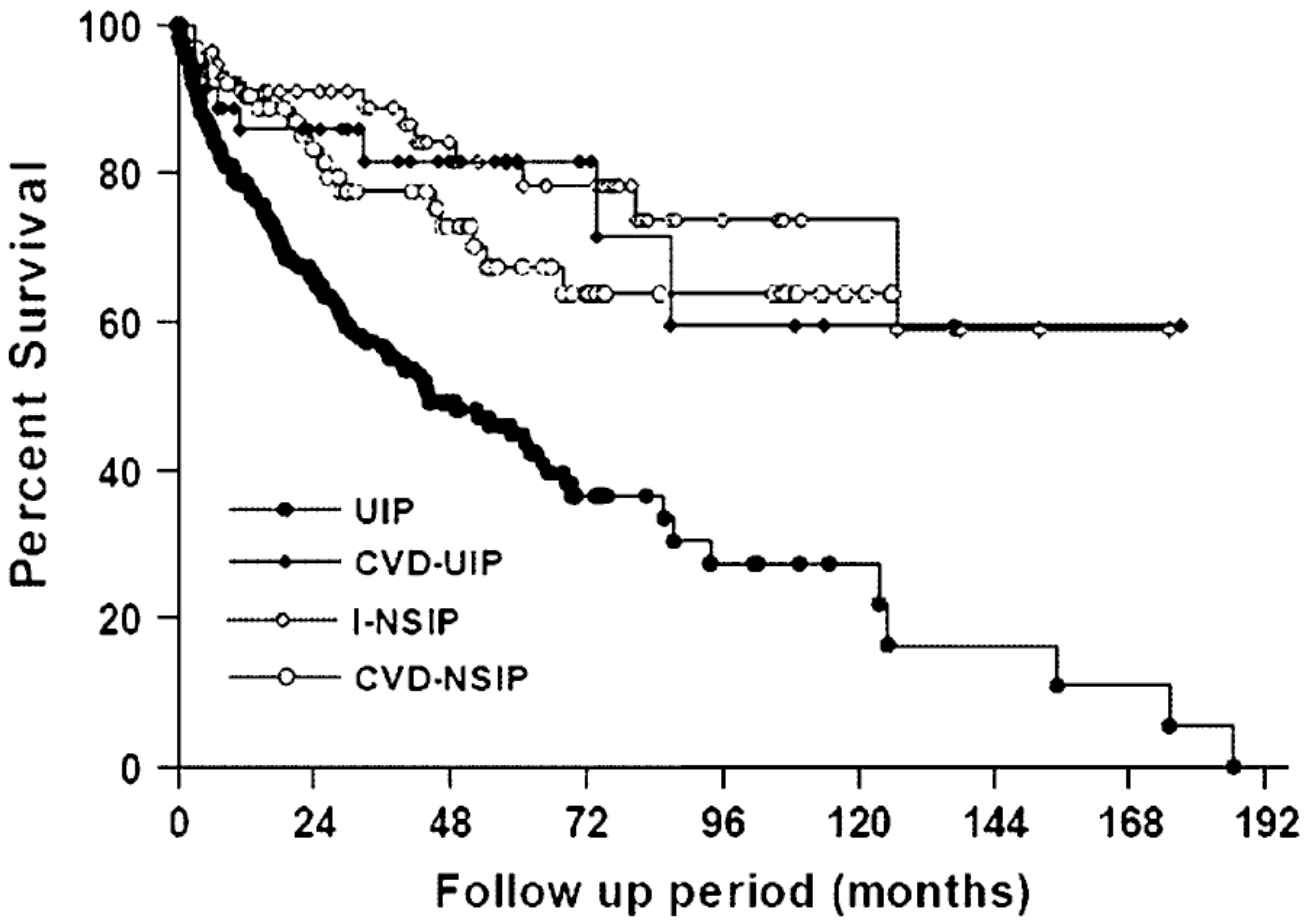
Mr. D.S

- 64 year old male
- Slowly progressive cough and dyspnea over last few years, more for the last one year
- Basilar crackles on exam
- CXR showed interstitial opacities
- Referred to your clinic for a formal evaluation

Broad/Simplistic categories of ILDs



Survival differs in ILDs



Park et al. AJRCCM 2007

Treatment of non-IPF related ILDs

Immunosuppressive/cytotoxic medications are useful in treating non-IPF ILDs including cryptogenic organizing pneumonia, hypersensitivity pneumonitis, connective tissue associated ILD etc.

- Corticosteroids
- Azathioprine
- Mycophenolate
- Cyclophosphamide
- Others

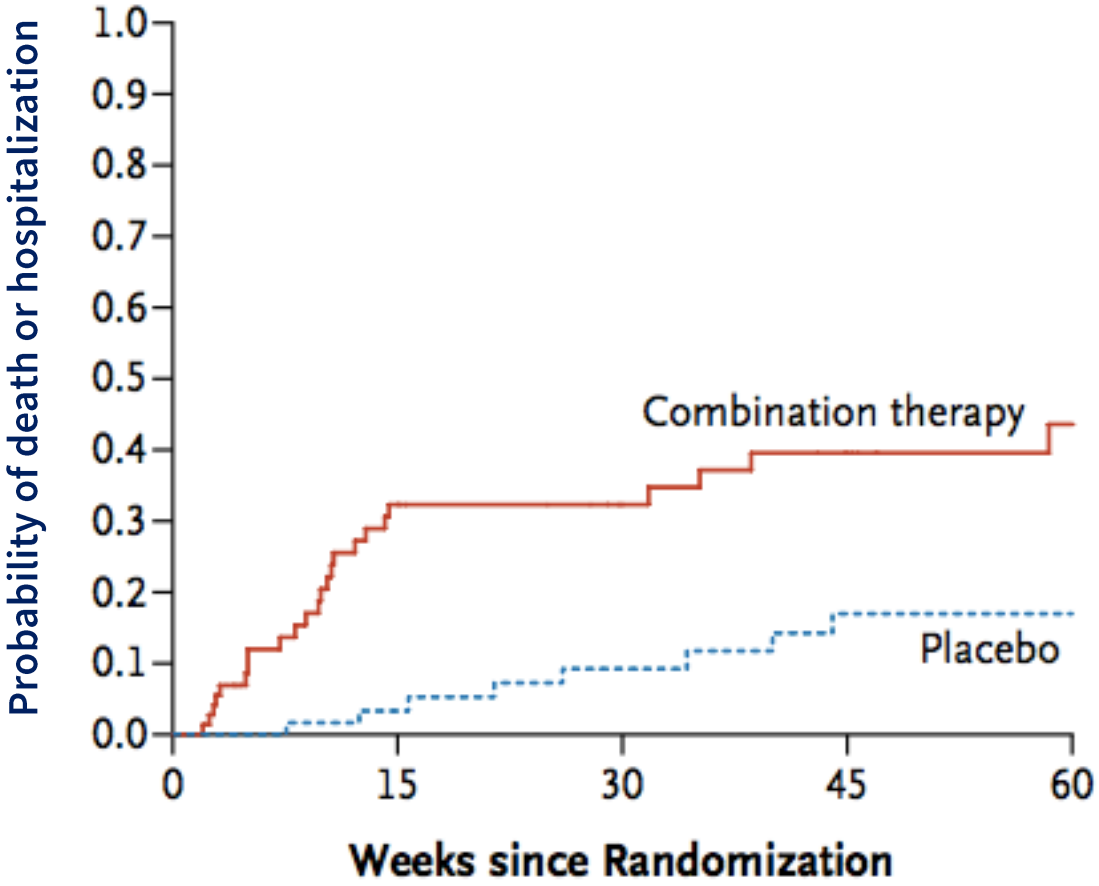
Patients with IPF should generally not be treated chronically with corticosteroids

Corticosteroids for idiopathic pulmonary fibrosis (Review)

Richeldi L, Davies HRHR, Spagnolo P, Luppi F

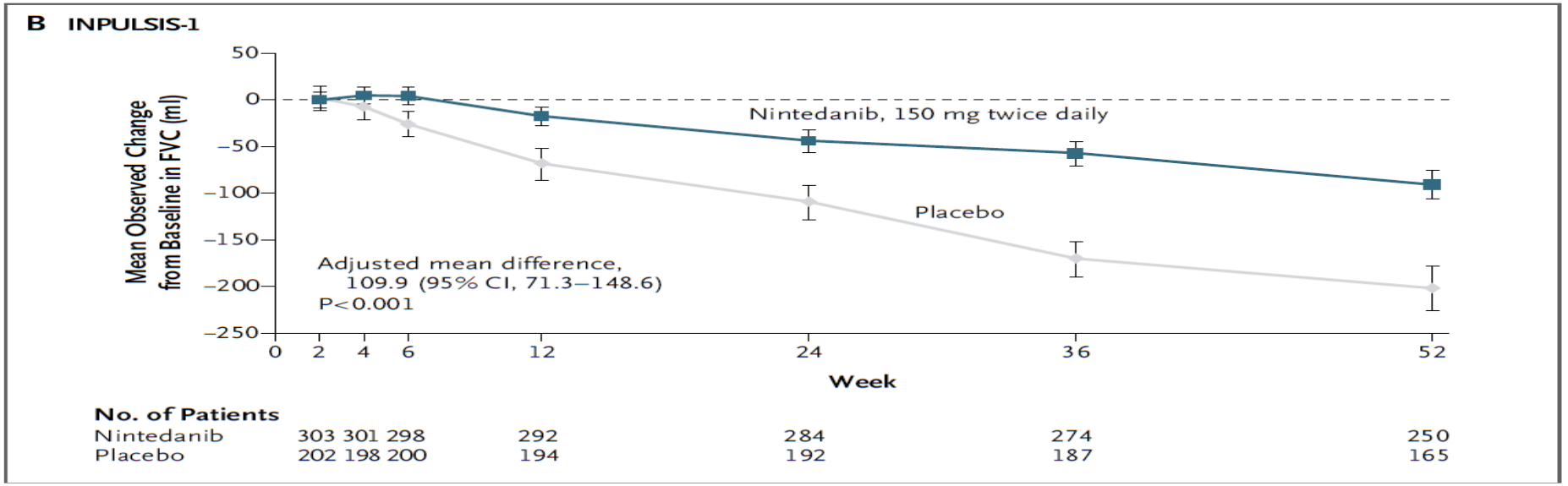
THE COCHRANE COLLABORATION®

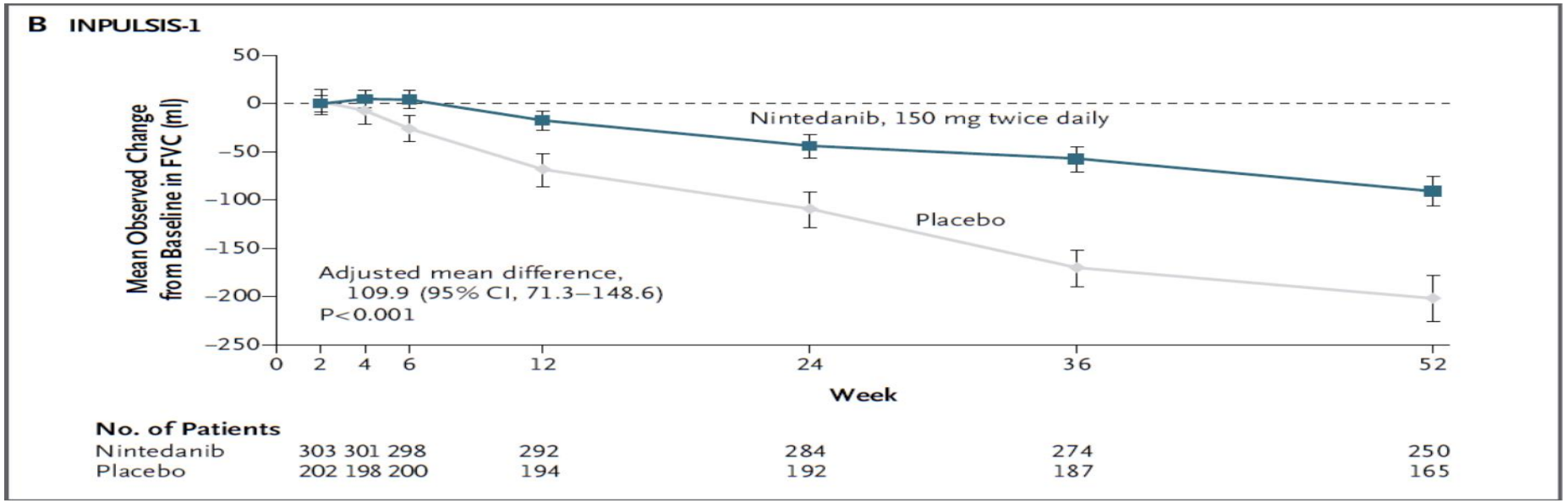
Patients with IPF on prednisone and azathioprine are more likely to die or be hospitalized than those on placebo



IPF Network NEJM 2012

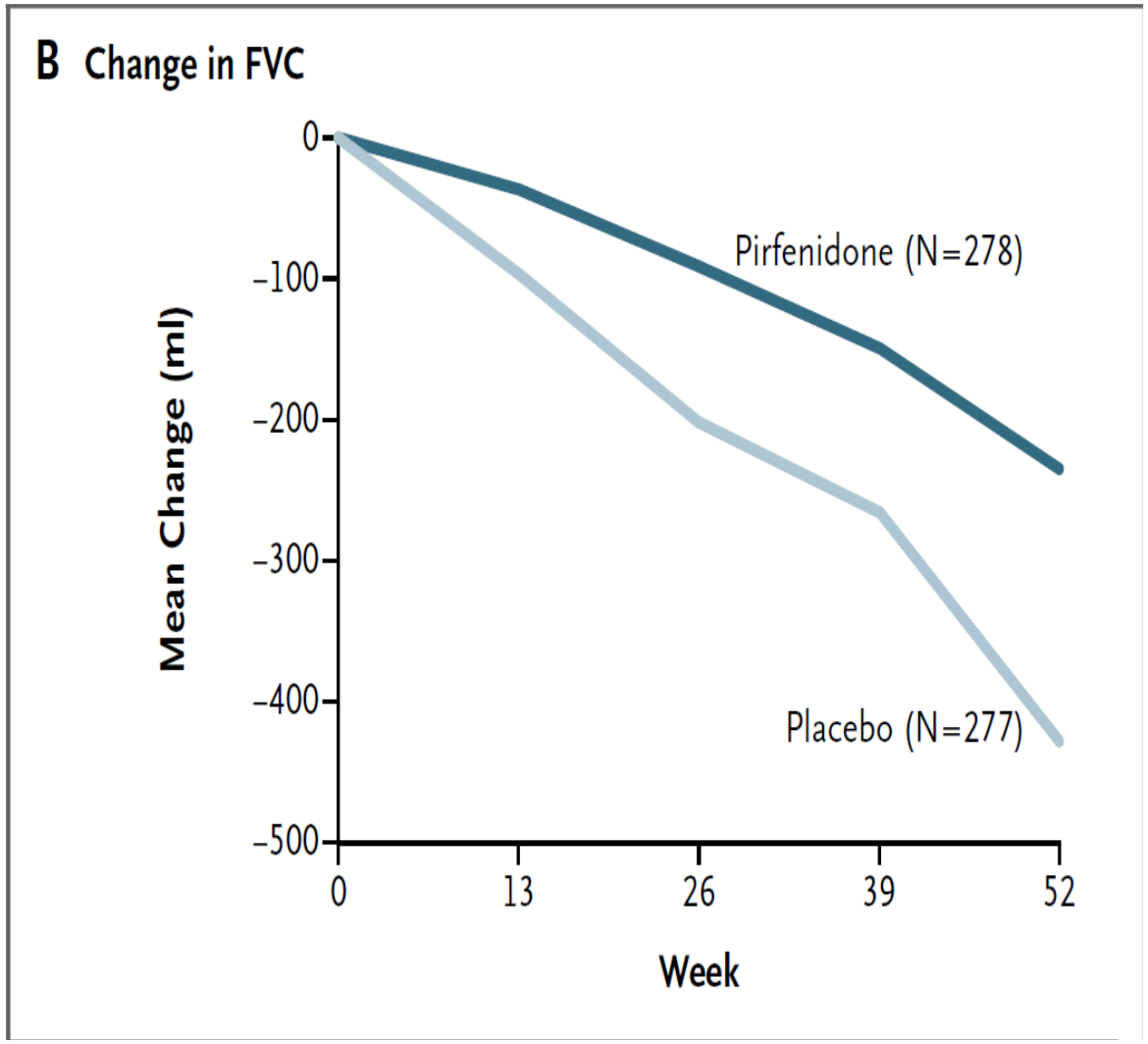
Nintedanib reduces rate of FVC decline in IPF patients

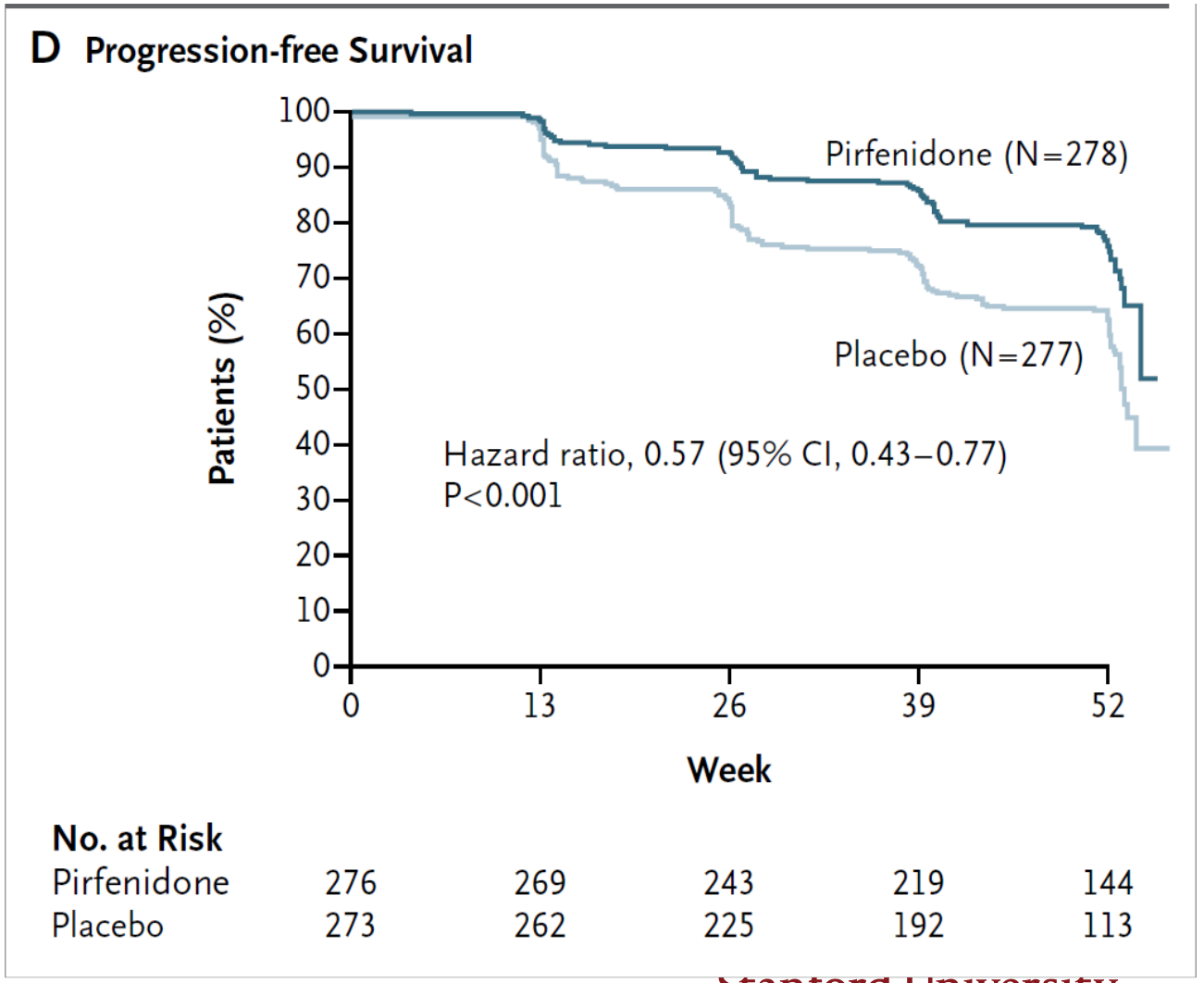




Richeldi et al. NEJM May 2014

Pirfenidone reduces the rate of decline of FVC





King et al. NEJM May 2014

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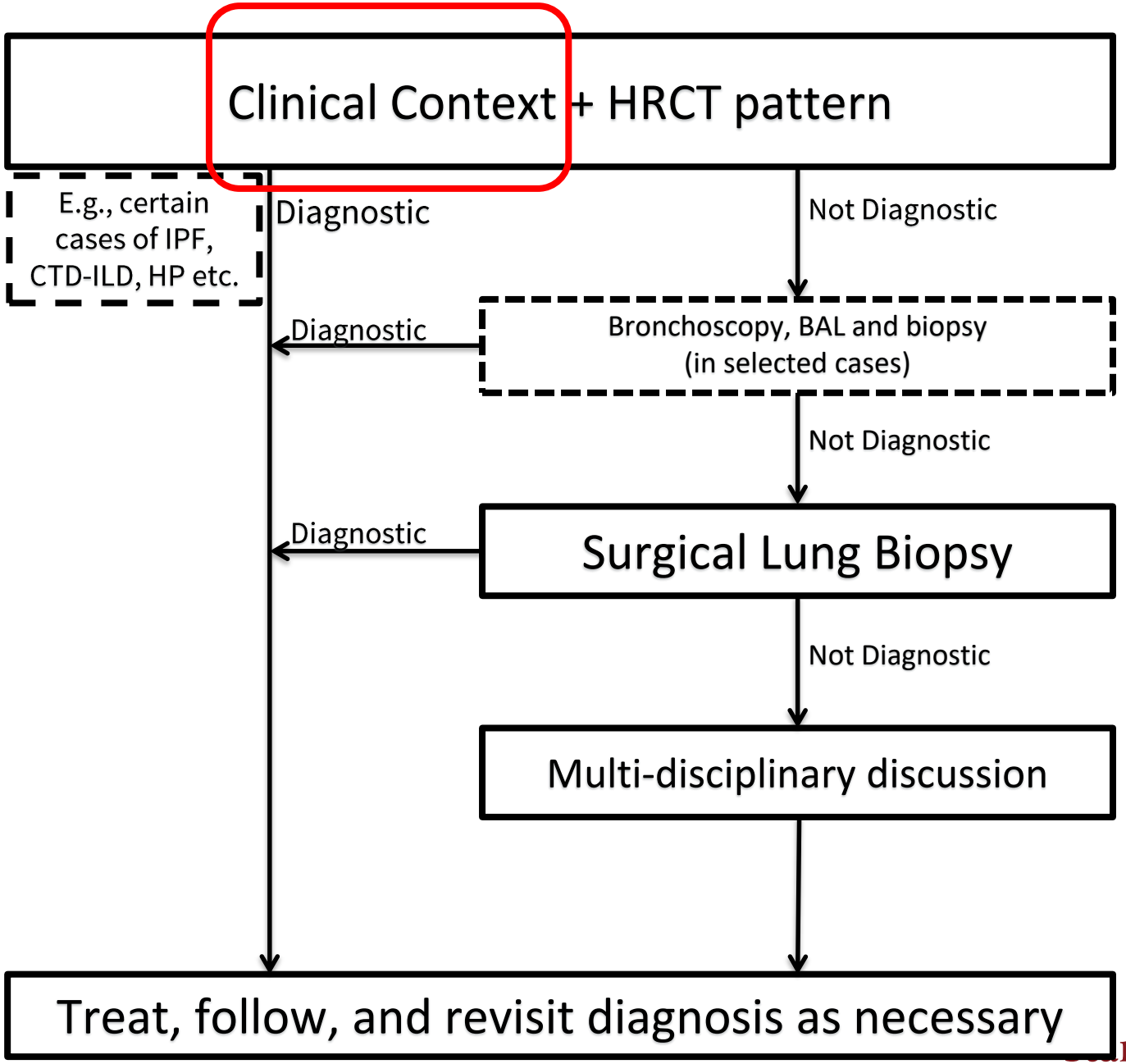
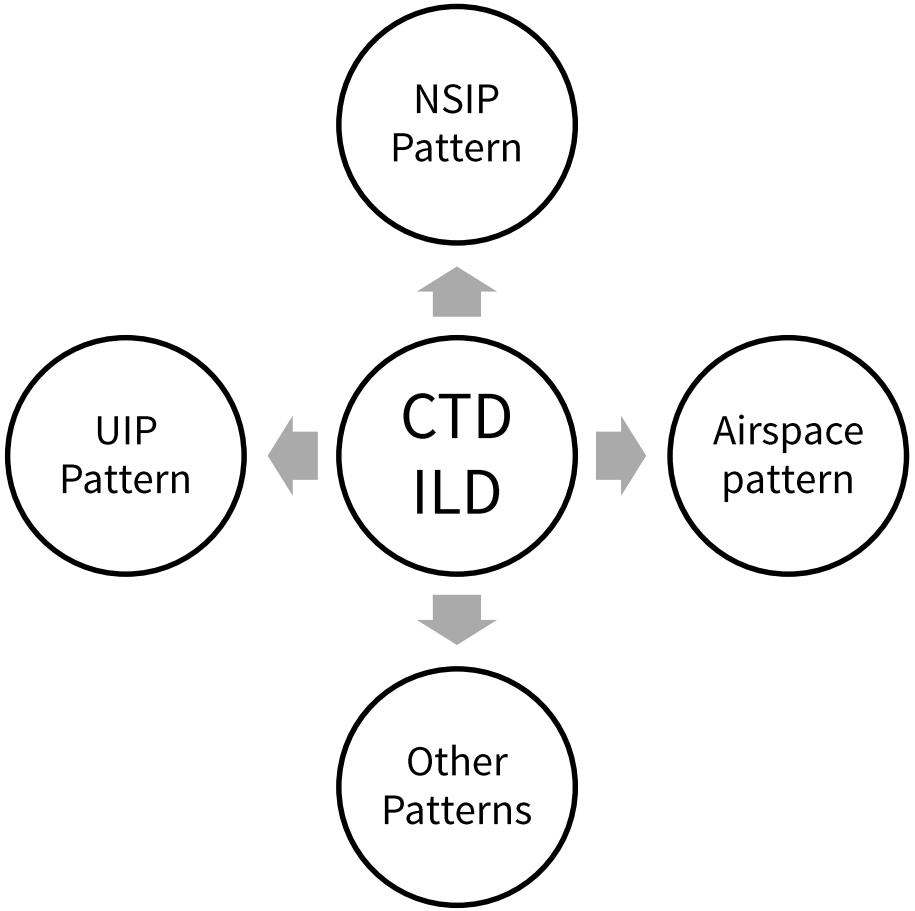


Raj et al. Chest 2016

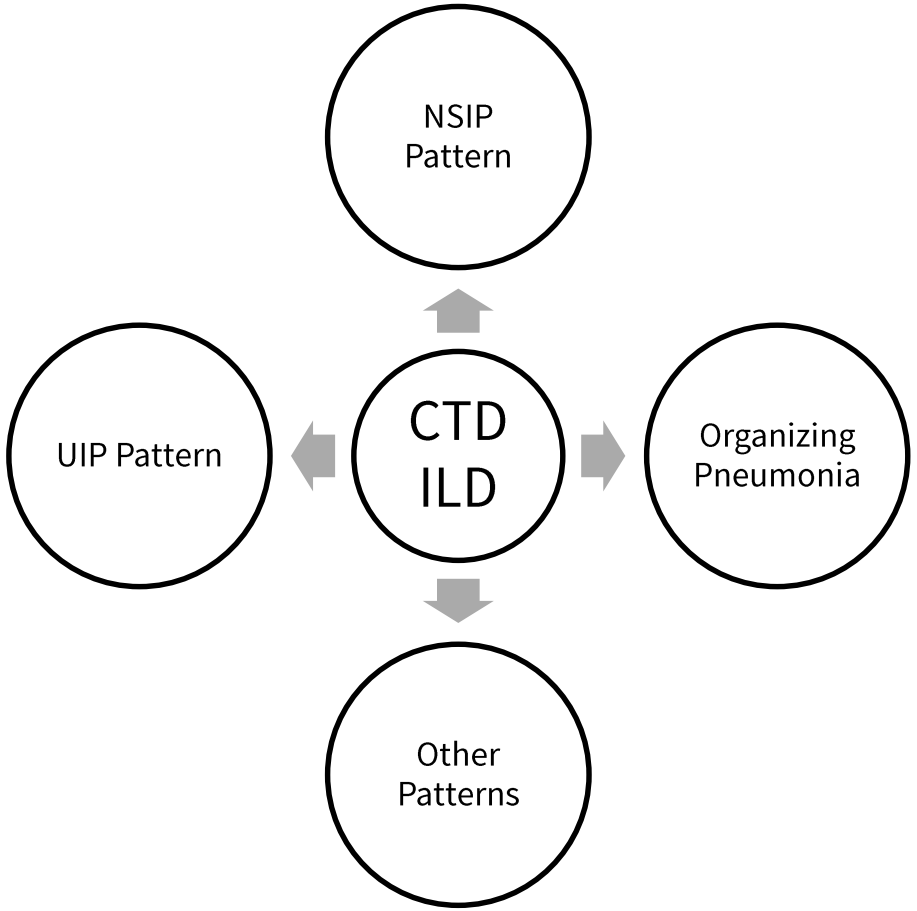
Clinical exam is THE most important tool in the diagnosis of Interstitial Lung Diseases

ILD from one etiology can present with different radiologic and histopathologic patterns

Radiologic Patterns

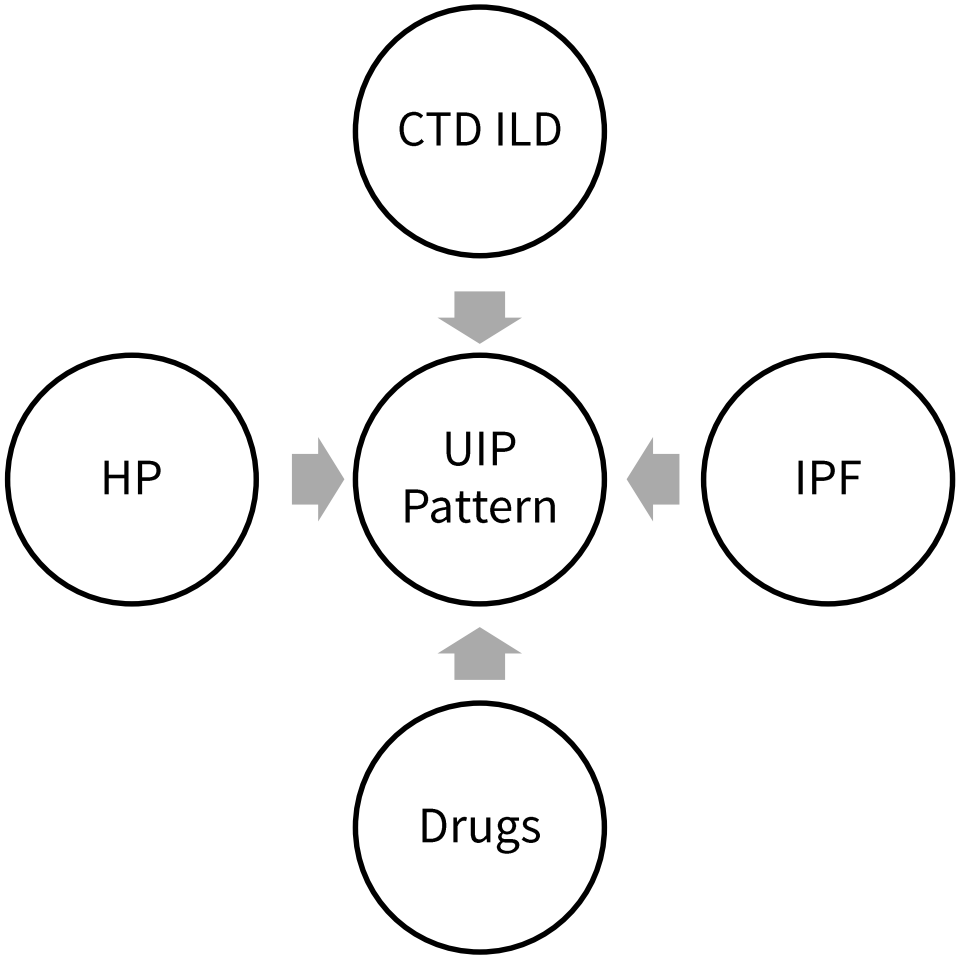


Histopathologic Patterns

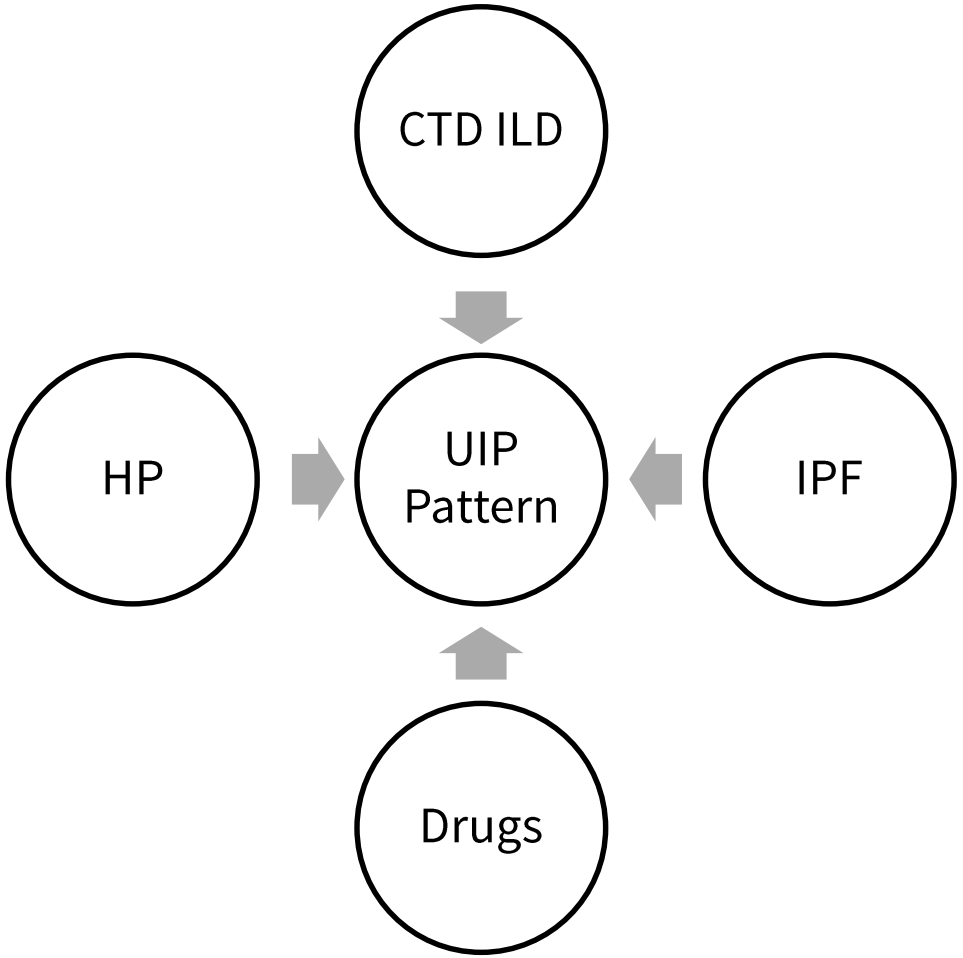


ILDs from different etiologies share the same radiologic and histopathologic patterns

Radiologic Patterns



Histopathologic Patterns



ILD Questionnaires

Date:_____ Name:_____MR# _____

STANFORD
HOSPITAL & CLINICS
Stanford University Medical Center

Stanford University Medical Center
Center for Interstitial Lung Disease: New Patient Questionnaire






Radiographs and other workup as indicated

Serologic testing

- Rheumatoid factor
- Anti-Scl 70
- Etc.

Formal rheumatology consultation

Inhalational Exposures (Hypersensitivity Pneumonitis)

Agent*	Source	Disease
Microbes		
Thermophilic actinomycetes	Moldy plant materials	Farmer's lung
***Saccharopolyspora rectivirgula* (*Micropolyspora faeni*)**	Moldy hay	
Thermoactinomyces vulgaris	Moldy hay, compost	Farmer's lung, mushroom-worker's lung, composter's lung
Thermoactinomyces sacchari	Sugar cane residue	Bagassosis
Bacillus subtilis	Detergent enzymes	Detergent-worker's lung
Aspergillus clavatus	Moldy grains	Malt-worker's lung
Aspergillus versicolor	Animal bedding	Dog house disease
Aspergillus species	Tobacco mold	Tobacco-worker's lung
Penicillium casei	Cheese mold	Cheese-washer's lung
Penicillium frequentans	Moldy cork	Suberosis
Penicillium chrysogenum	Moldy wood dust	Woodworker's lung
Cryptostroma corticale	Moldy maple bark	Maple bark–stripper's lung
Aureobasidium pullulans	Moldy sequoia dust	Sequoiosis
Aureobasidium species	Contaminated water	Sauna-taker's disease
Alternaria species	Wood or wood pulp	Woodworker's lung
Merulius lacrymans	—	Dry rot lung
Botrytis cinerea	Grape mold	Winegrower's lung or Spätlase lung
Trichosporon cutaneum	Mold in Japanese homes	Summer-type HP
Cephalosporium	Sewage	Sewage-worker's lung
Mucor stolonifer	Paprika	Paprika-splitter's lung
Candida albicans	Saxophone mouthpiece	Sax lung
Mycobacterium avium-intracellulare	Contaminated water	Hot tub lung
Mixed ameba, fungi, and bacteria	Cold mist and other humidifiers, air conditioners	Nylon plant or office worker's or air conditioner's lung, ventilation pneumonitis
Bacteria and fungi	Contaminated metal-working fluids	Machine-operator's lung
Animals		
Avian proteins	Bird excreta, blood, or feather	Bird-breeder's lung, bird-fancier's lung, pigeon-breeder's lung
Rat proteins	Rat urine or serum	Rodent-handler's lung
Gerbil proteins	Gerbil	Gerbil-keeper's lung
Animal fur protein	Animal fur	Furrier's lung
Ox and pork protein	Pituitary snuff	Pituitary snuff–taker's lung
Mollusk shell protein	Mollusk shell dust	Oyster shell lung
Fish	Fish meal dust	Fishmeal-worker's lung
Wheat weevil	Flour	Miller's lung
Silk worm larvae proteins	Silk worm larvae	Sericulturist's lung
Plants		
Soybean	Soybean hulls	Soybean-worker's lung
Coffee	Coffee bean dust	Coffee-worker's lung
Lycoperdon species	Puffballs	Lycoperdonosis
Chemicals		
Isocyanates	Paints, plastics	Paint-refinisher's lung
Anhydrides	Plastics	Chemical-worker's lung, plastic-worker's lung, epoxy-worker's lung
Pauli's reagent	—	Pauli's reagent lung
Bordeaux mixture	Vineyard fungicide	Vineyard-sprayer's lung
Pyrethrum	Insecticides	Insecticide lung
Metals		
Cobalt	—	Hard metal lung disease
Beryllium	—	Berylliosis

*The more frequent causative agents are listed in bold type.

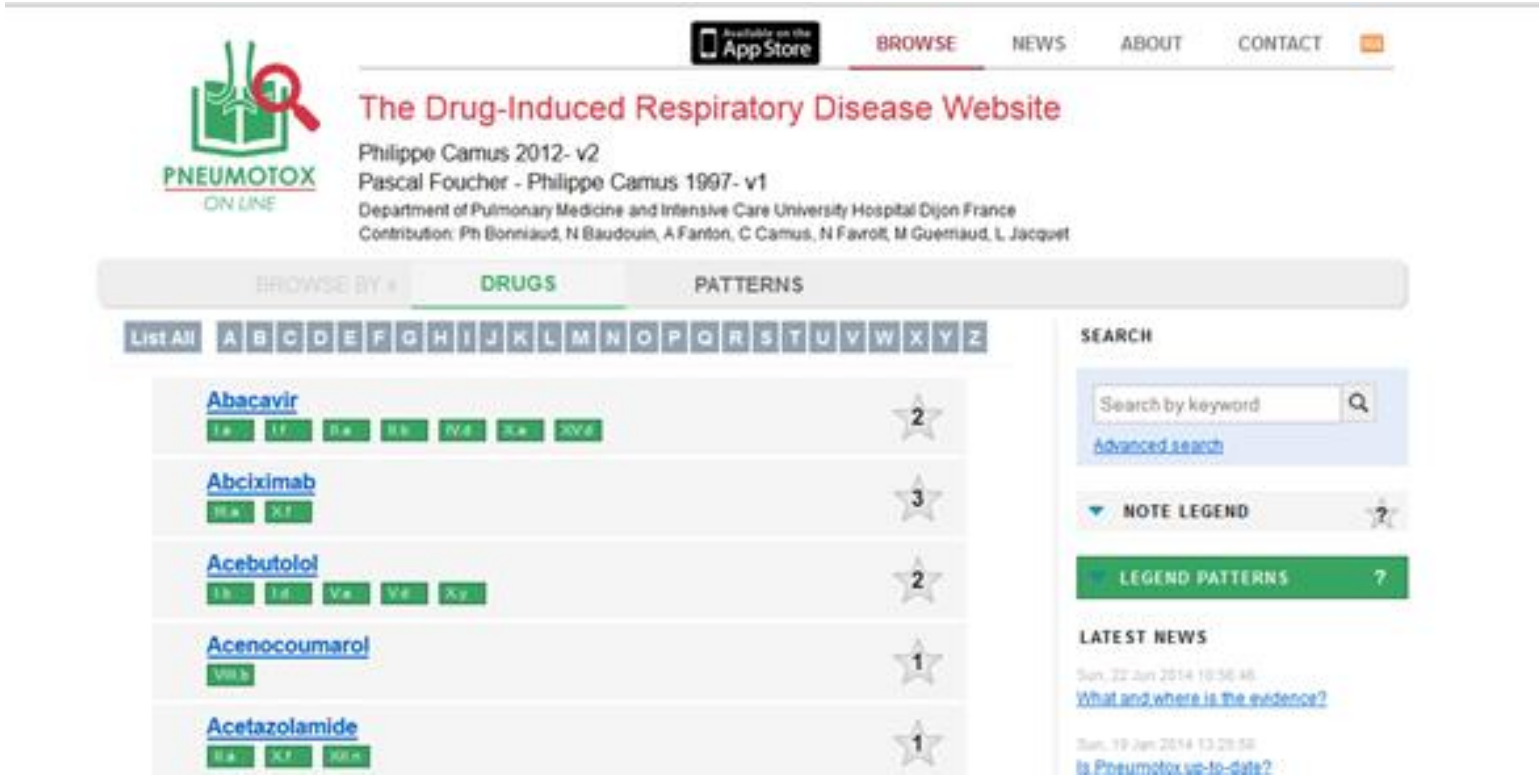
Medications and Occupations

Occupational lung diseases

- Occupational history
- ALL occupations

Drugs

- Common drugs
  - Nitrofurantoin
  - Methotrexate
  - Amiodarone
  - Etc.



Mr. D.S: Additional history

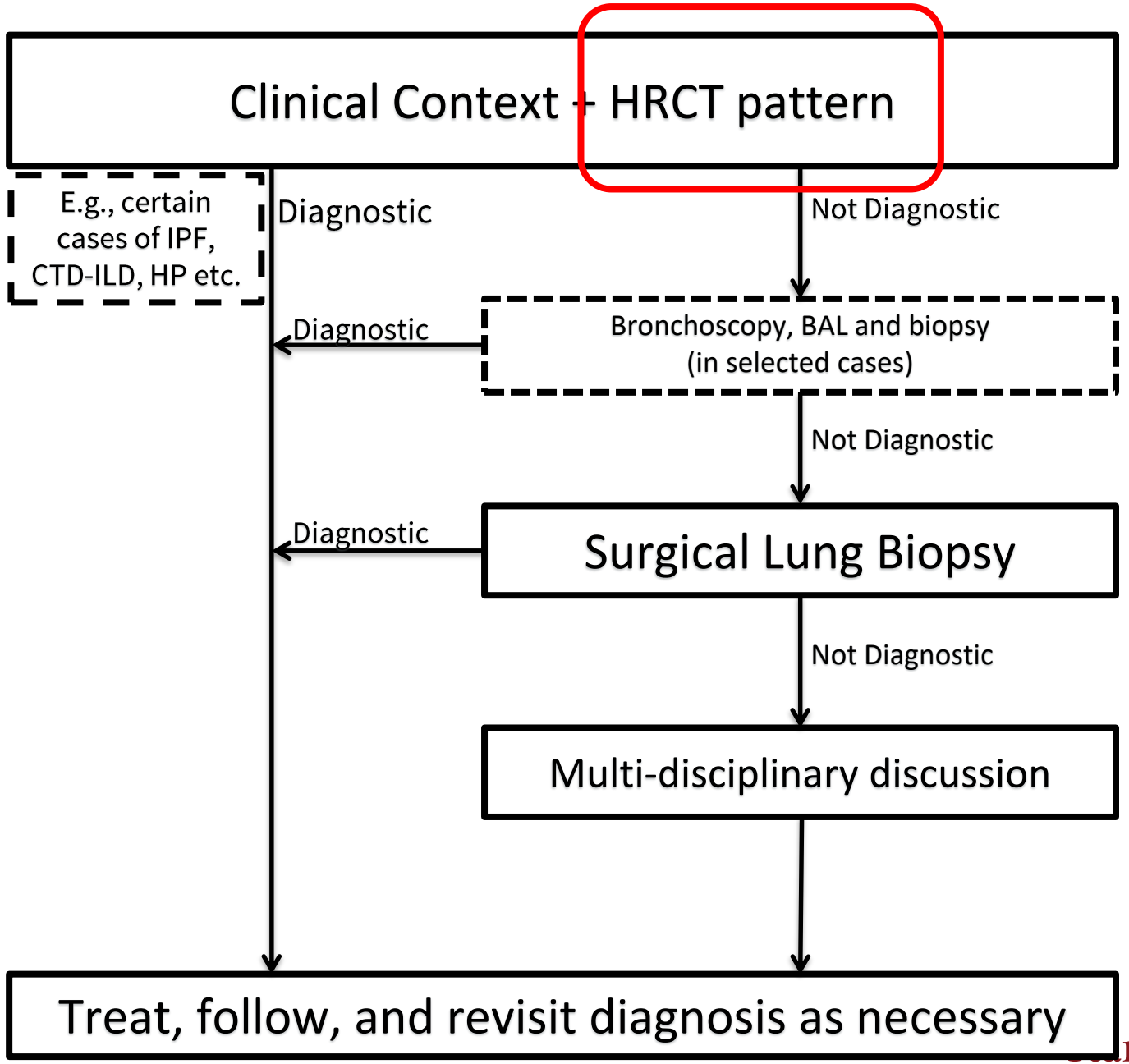
- Smoked 1 pack/day until 15 years ago
- Intermittent woodworking, but now wears mask
- Some mold in bathroom in home but otherwise no significant mold infestation
- Down clothing and bedding at home
- No diagnosis of a connective tissue disease but complaints of joint pain in hands and feet without associate swelling
- Physical exam did not show any evidence of active or past connective tissue disease

Mr. D.S: Working Diagnostic Considerations

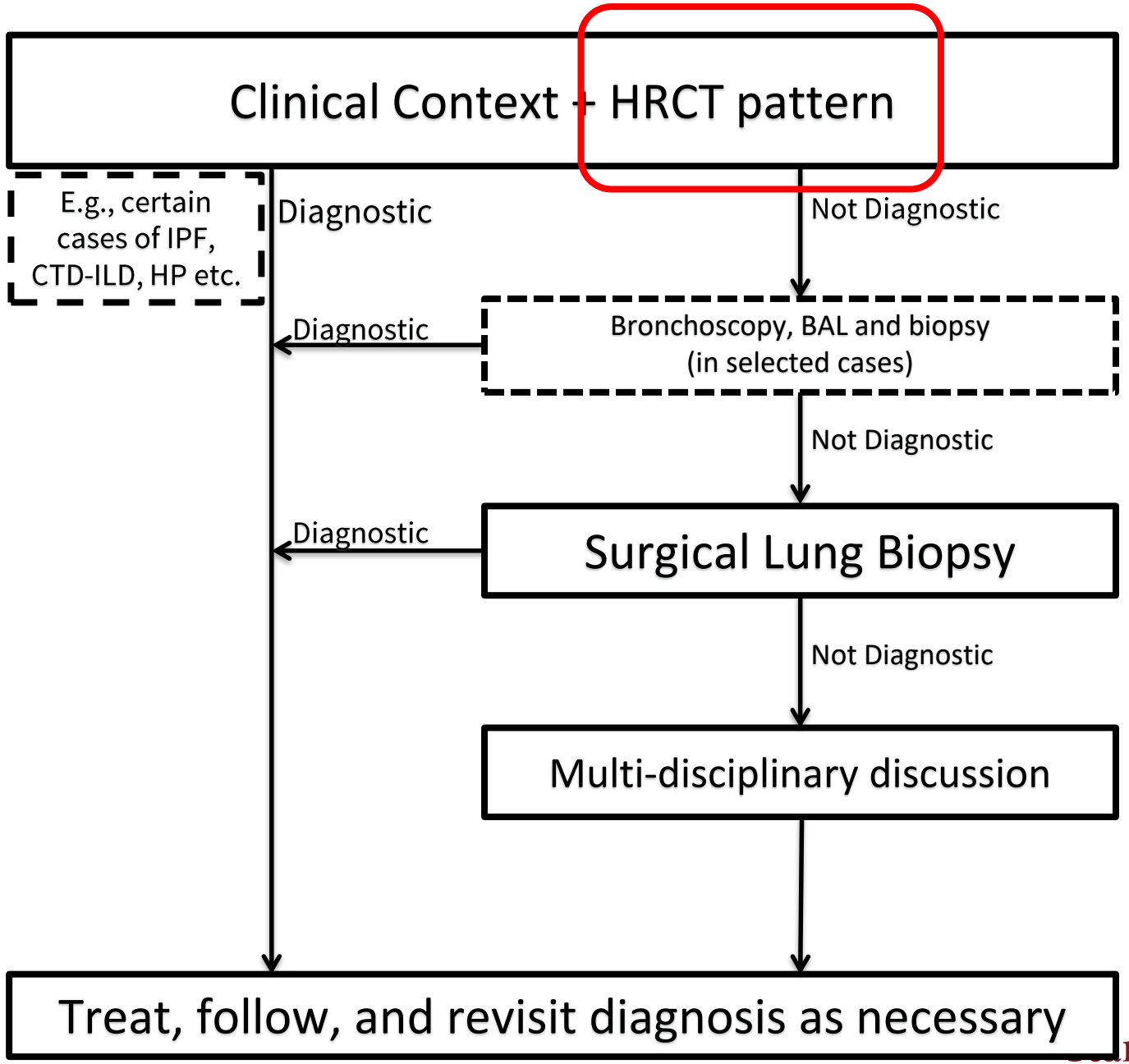
- Idiopathic Pulmonary Fibrosis
- Chronic Hypersensitivity Pneumonitis
- Rheumatoid Arthritis Associated Connective Tissue Disease

Mr. D.S

- The CRP, ESR, ANA, Anti Scl 70, SSA, SSB, Myositis panel were all negative except for slight elevation in RF and a positive Anti CCP



Raj et al. Chest 2016

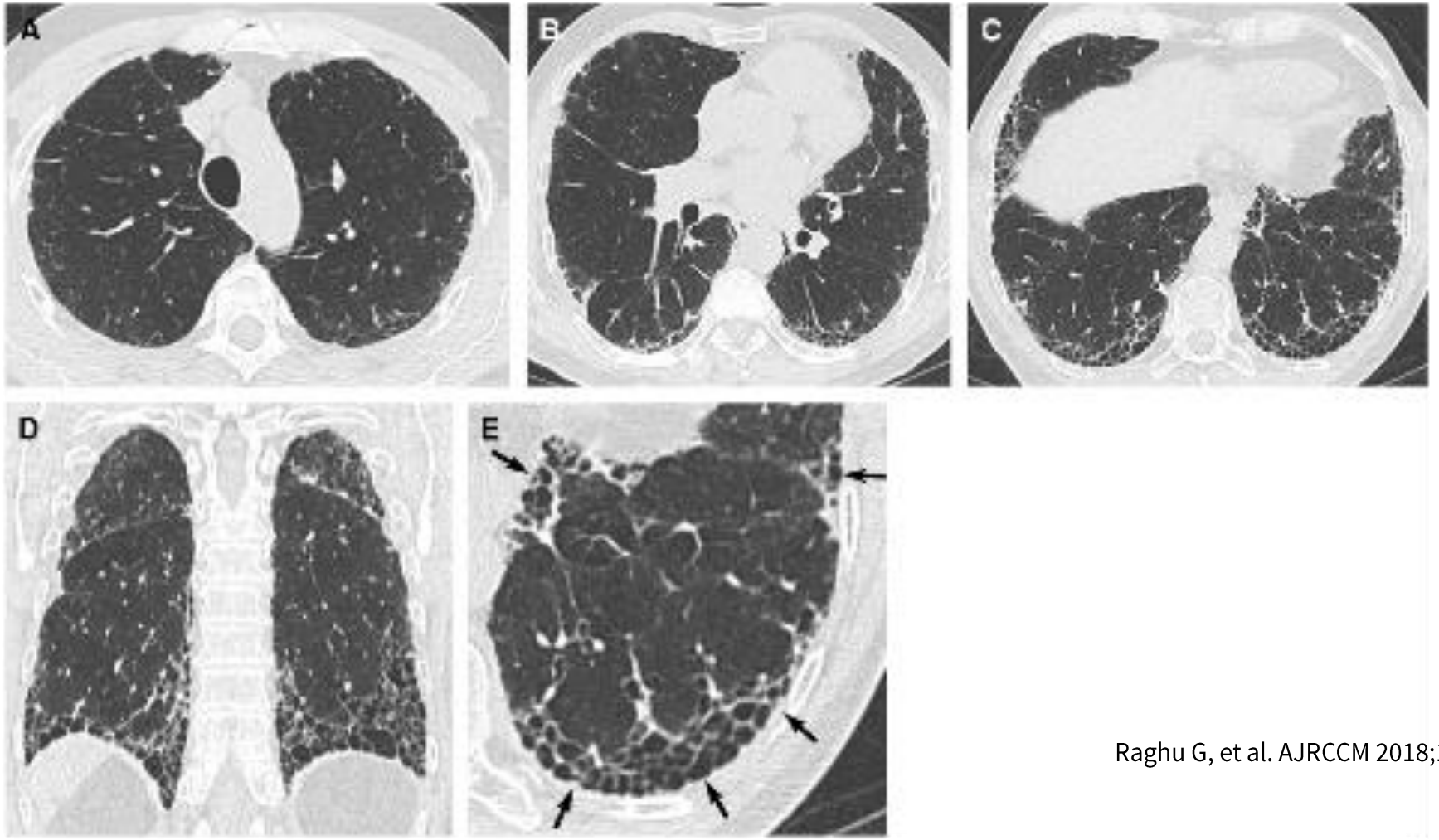


Raj et al. Chest 2016

HIGH RESOLUTION CT CHEST

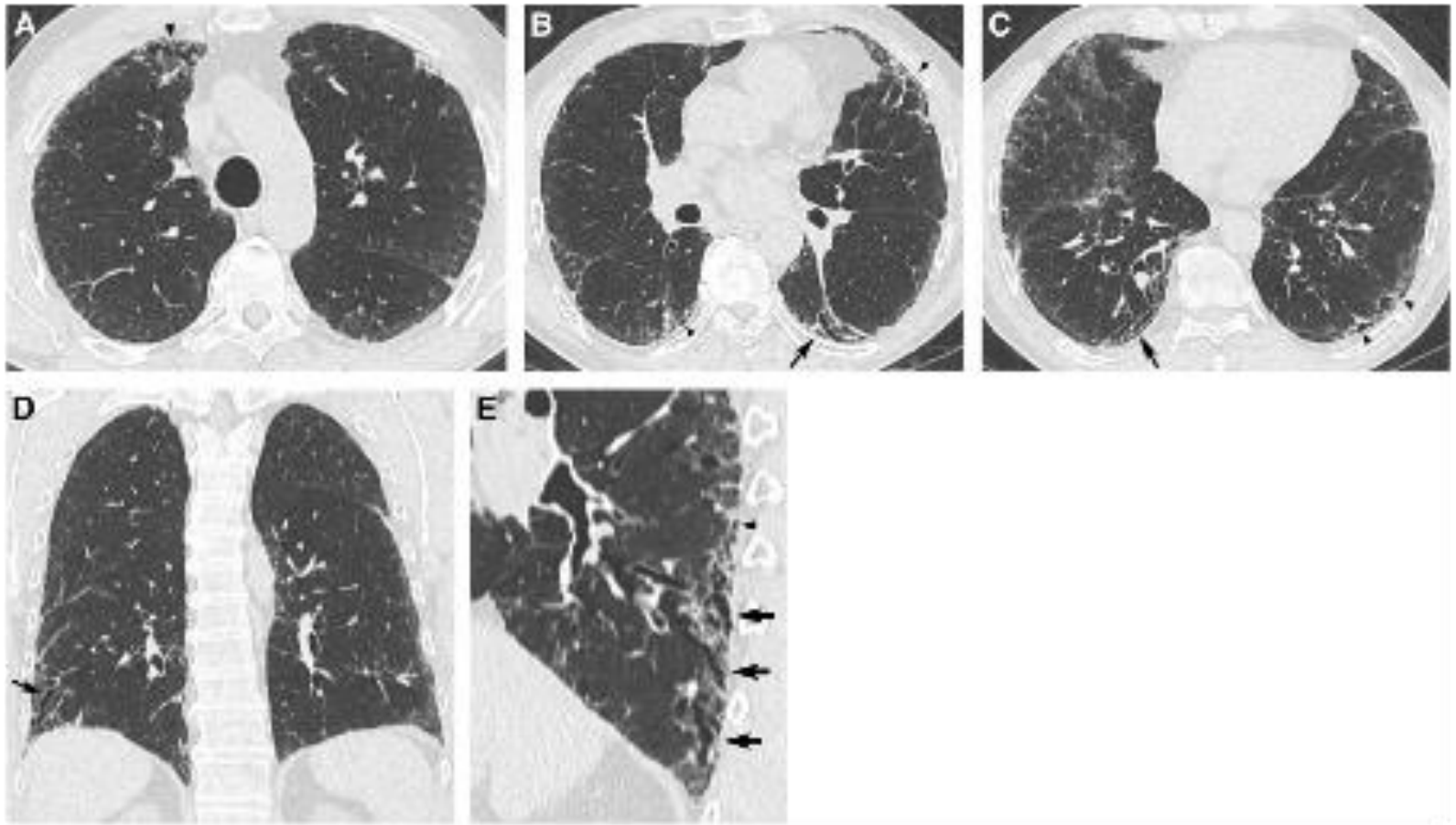
VARIOUS PATTERNS

CT Chest: Usual Interstitial Pneumonia Pattern



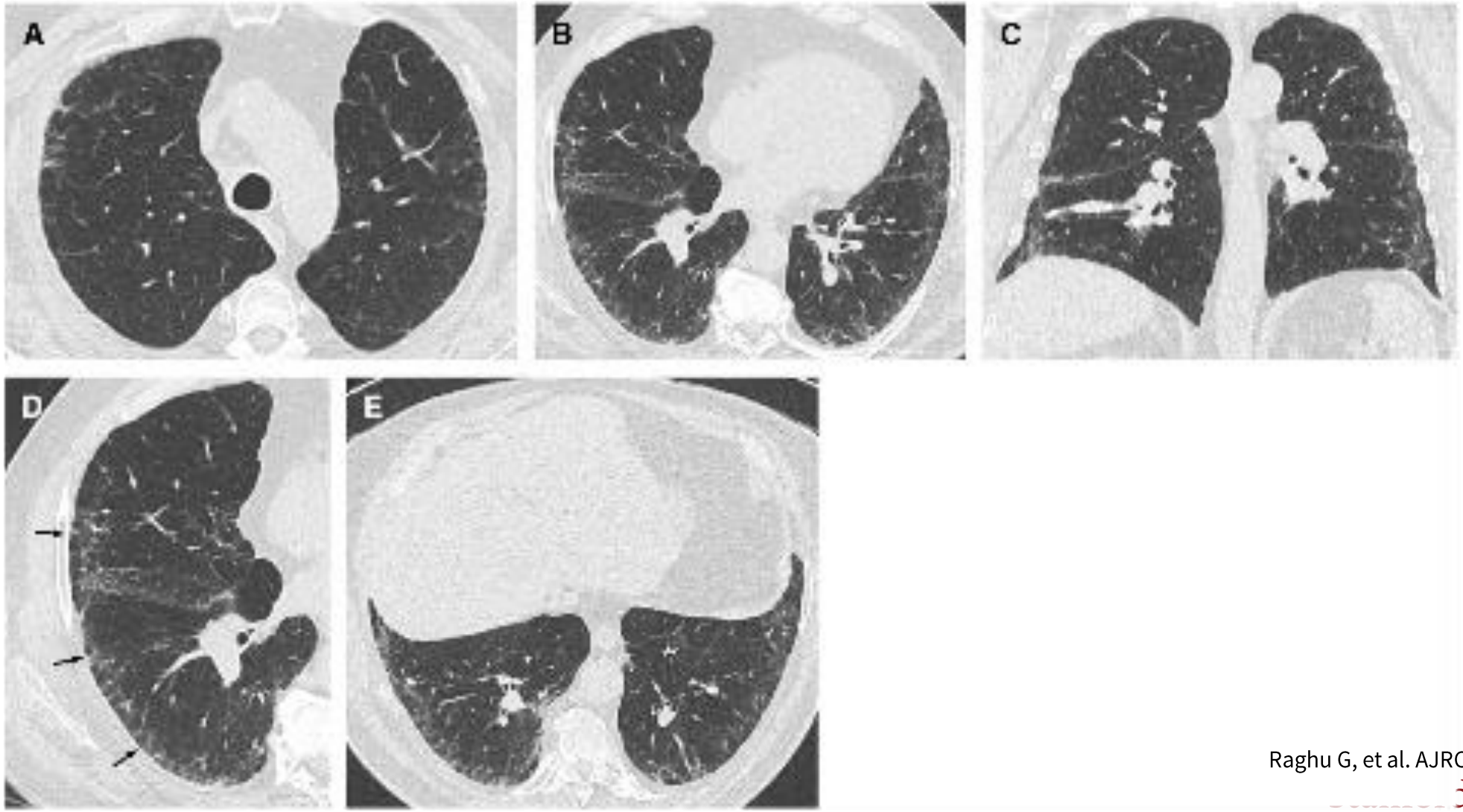
Raghu G, et al. AJRCCM 2018;198:e44-68.

CT Chest: Probable Usual Interstitial Pneumonia Pattern



Raghu G, et al. AJRCCM 2018;198:e44-68.

CT Chest: Indeterminate Pattern



Raghu G, et al. AJRCCM 2018;198:e44-68.

CT Chest: Alternative Diagnosis Pattern

Raghu G, et al. AJRCCM 2018;198:e44-68.

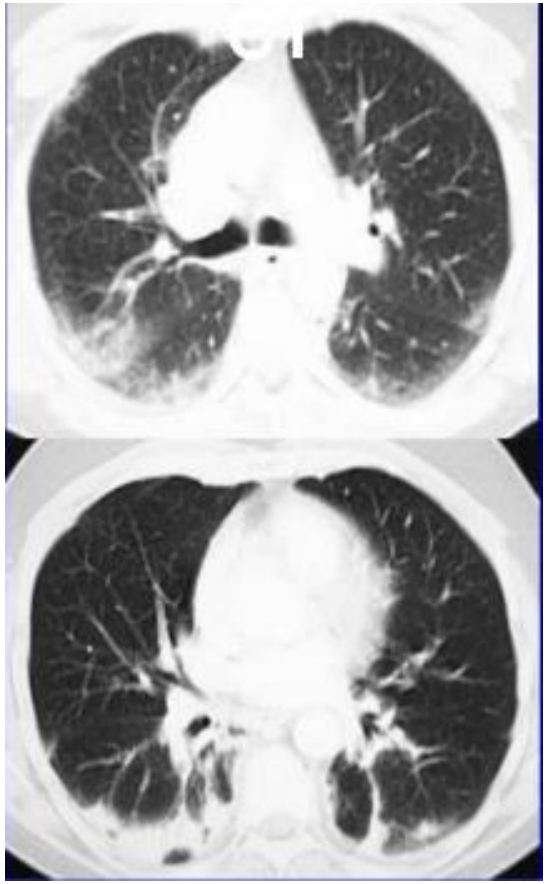
HIGH RESOLUTION CT CHEST

INTERSTITIAL LUNG DISEASE PROTOCOL

Stanford University

Conventional vs High Resolution CT

CONVENTIONAL



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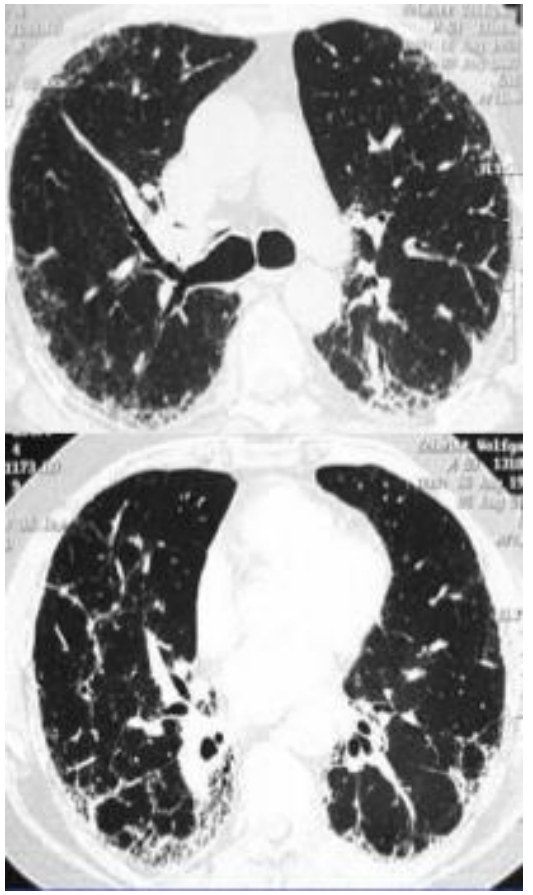
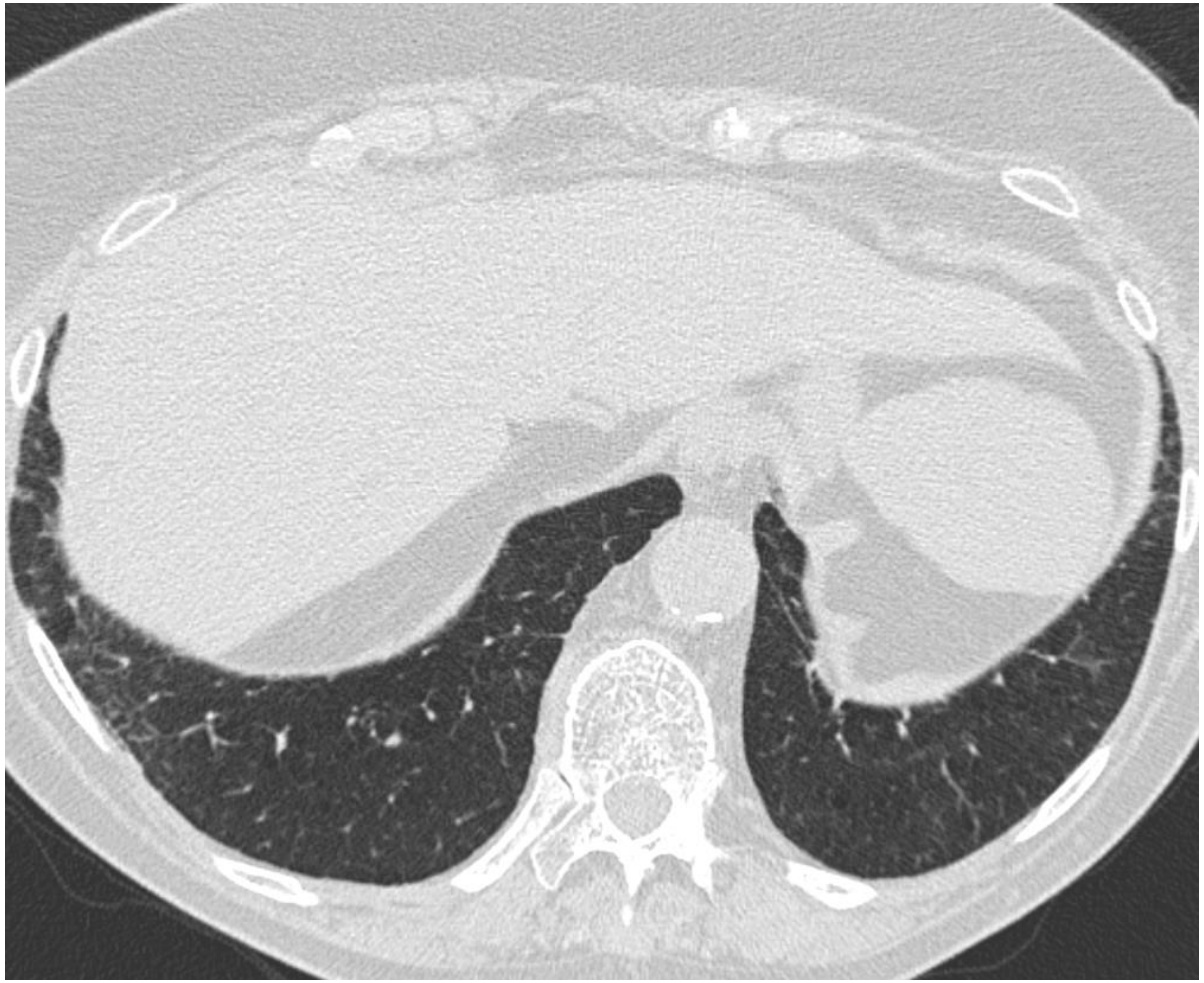
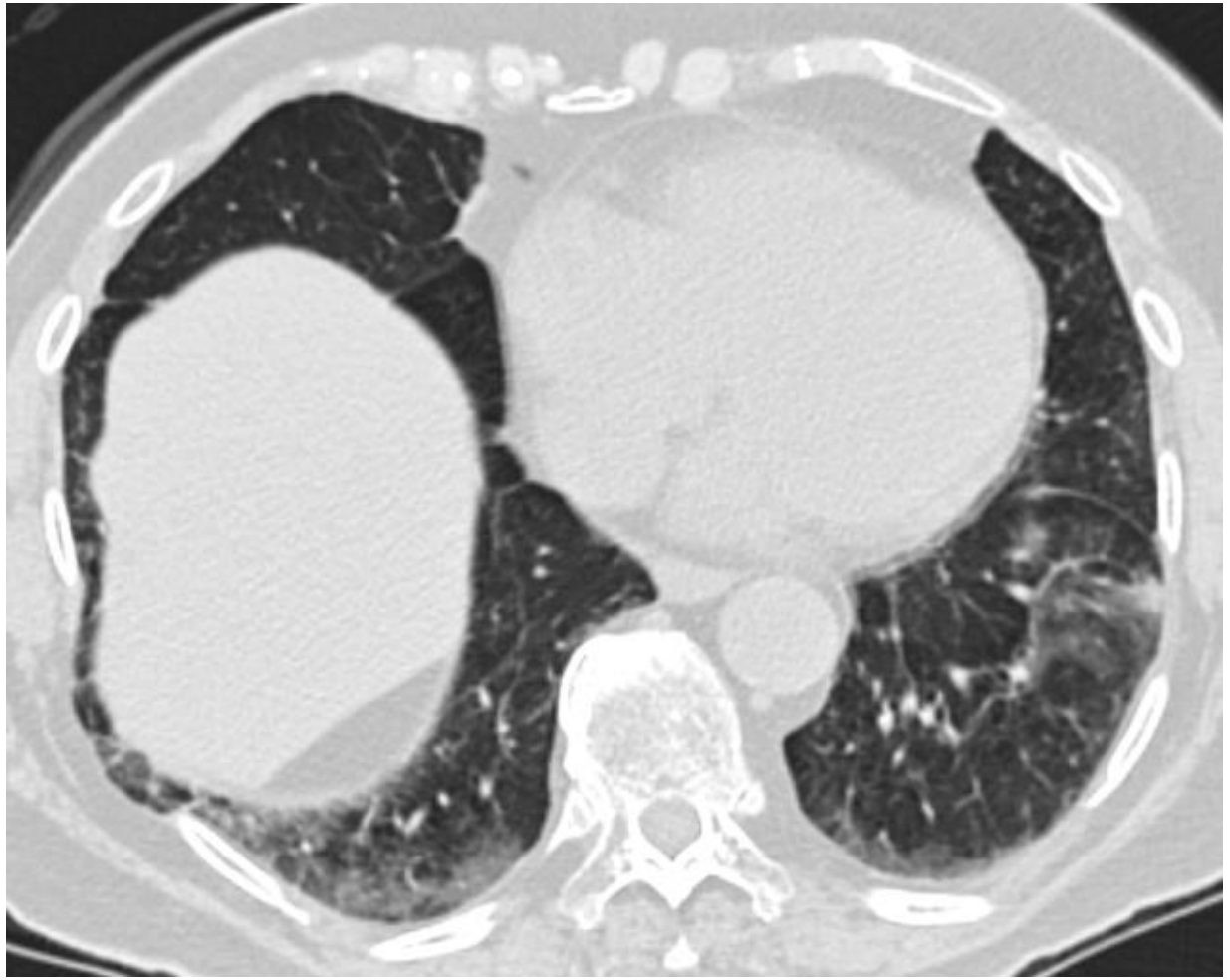
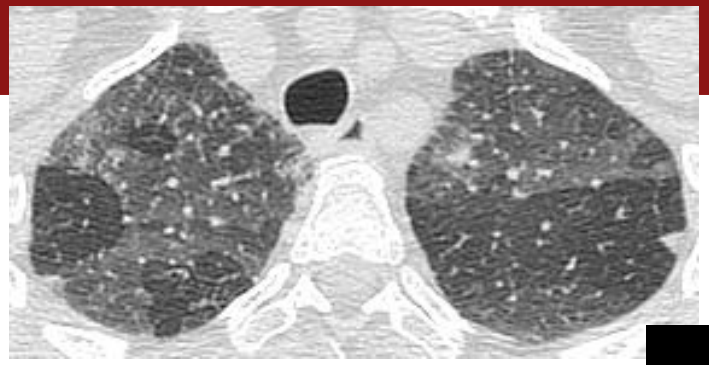


Prone vs. Supine Images

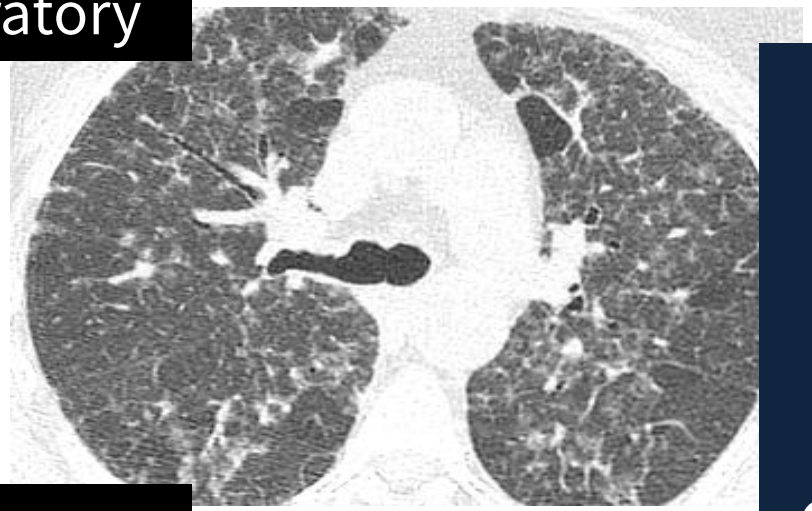




Inspiratory



Expiratory



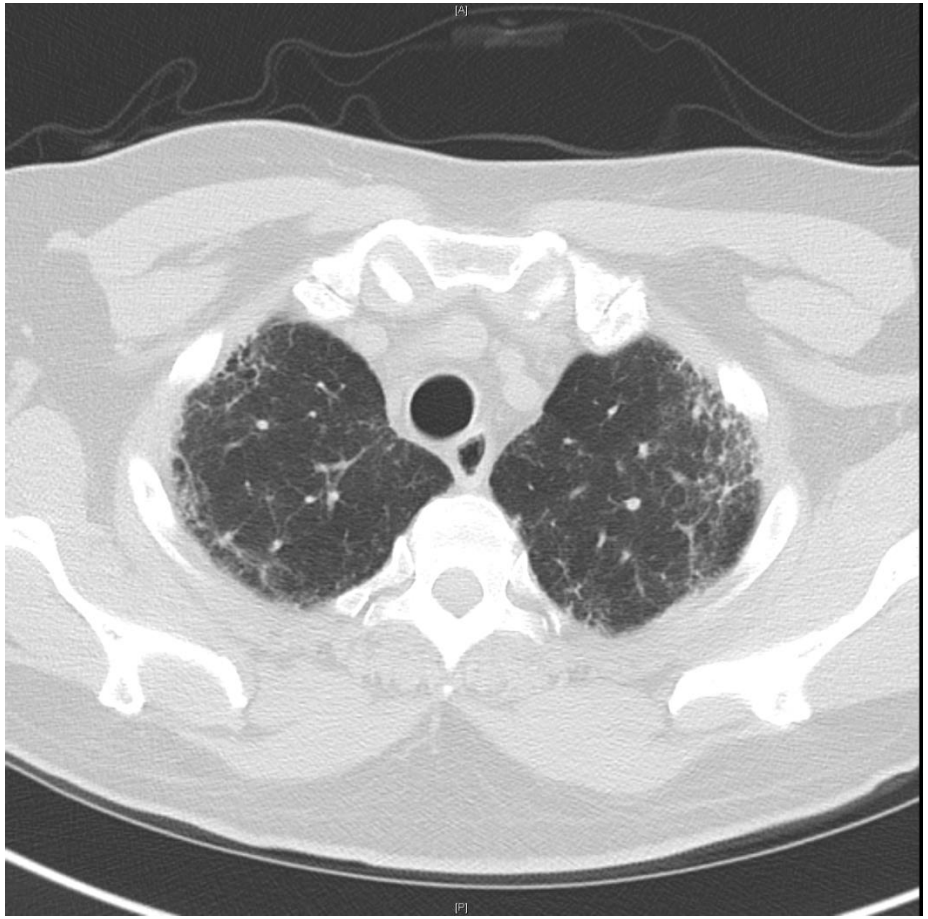
Inspiratory

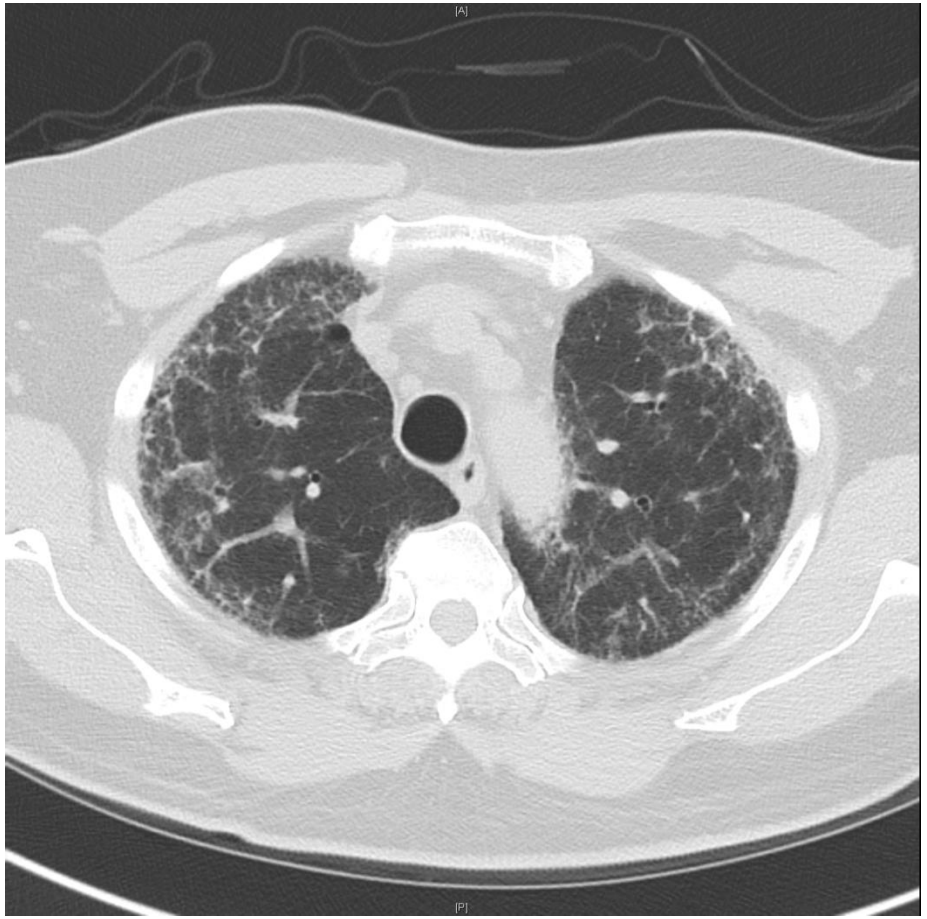
Air trapping is better appreciated on expiratory images

Expiratory

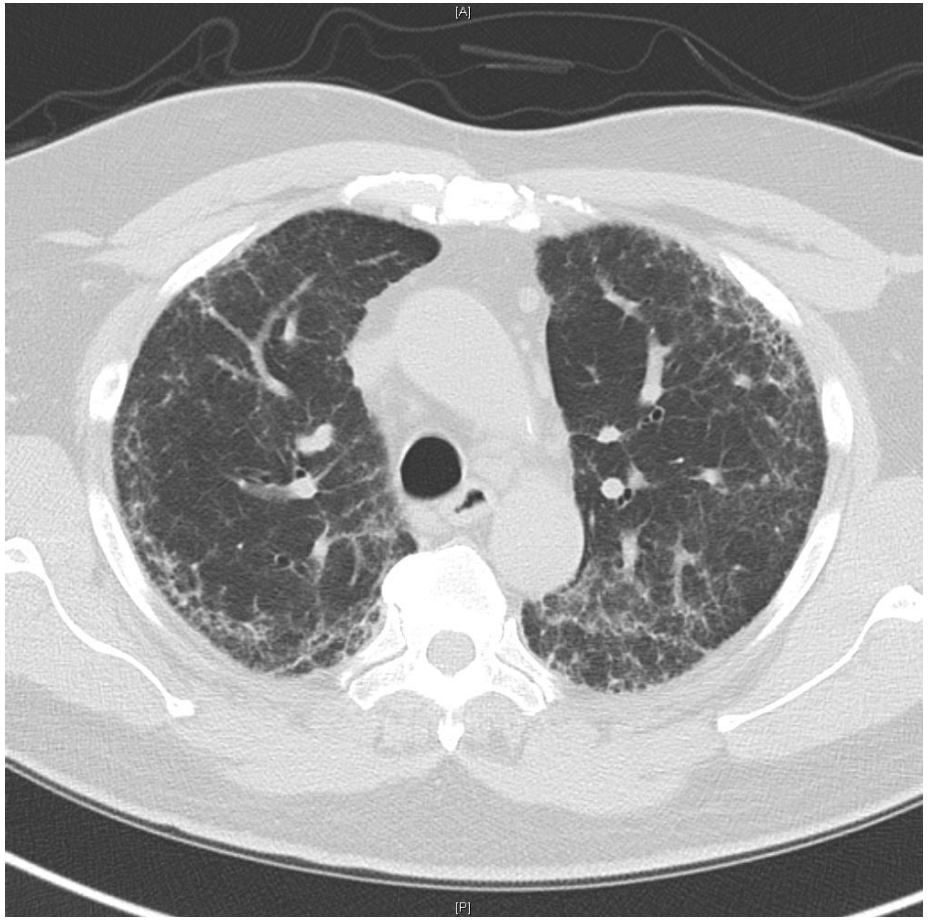
sity

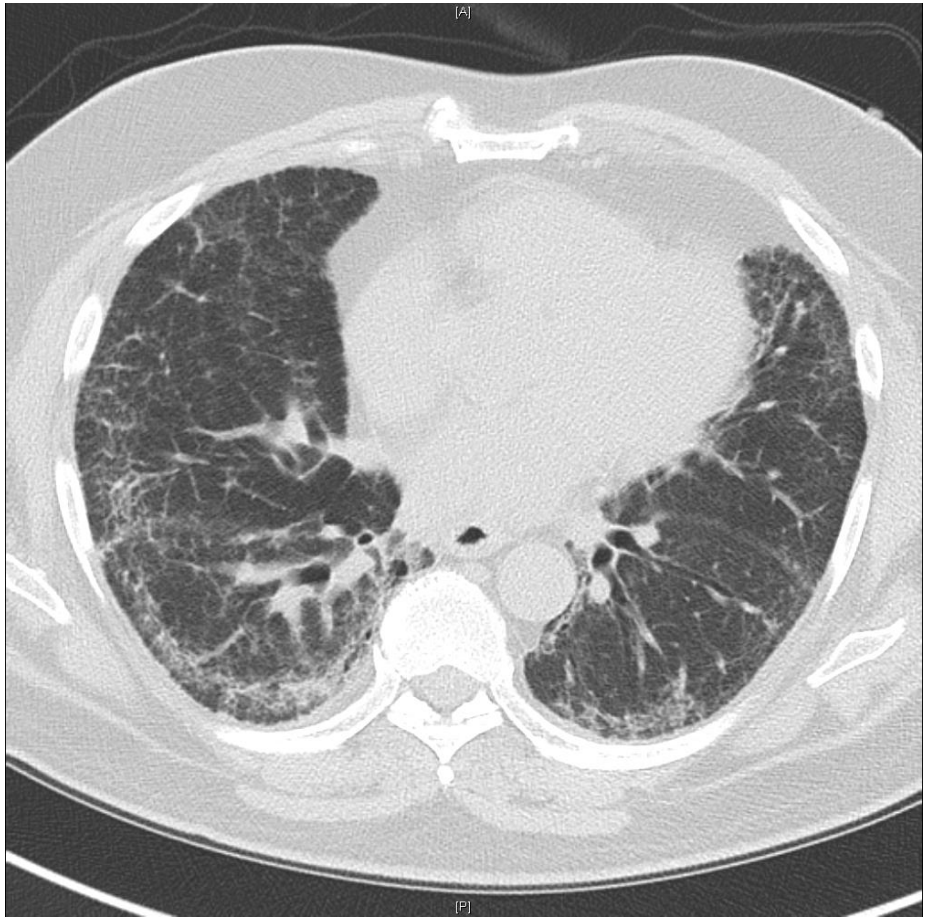
Mr. D.S: HRCT Images





Mr. D.S: HRCT Images





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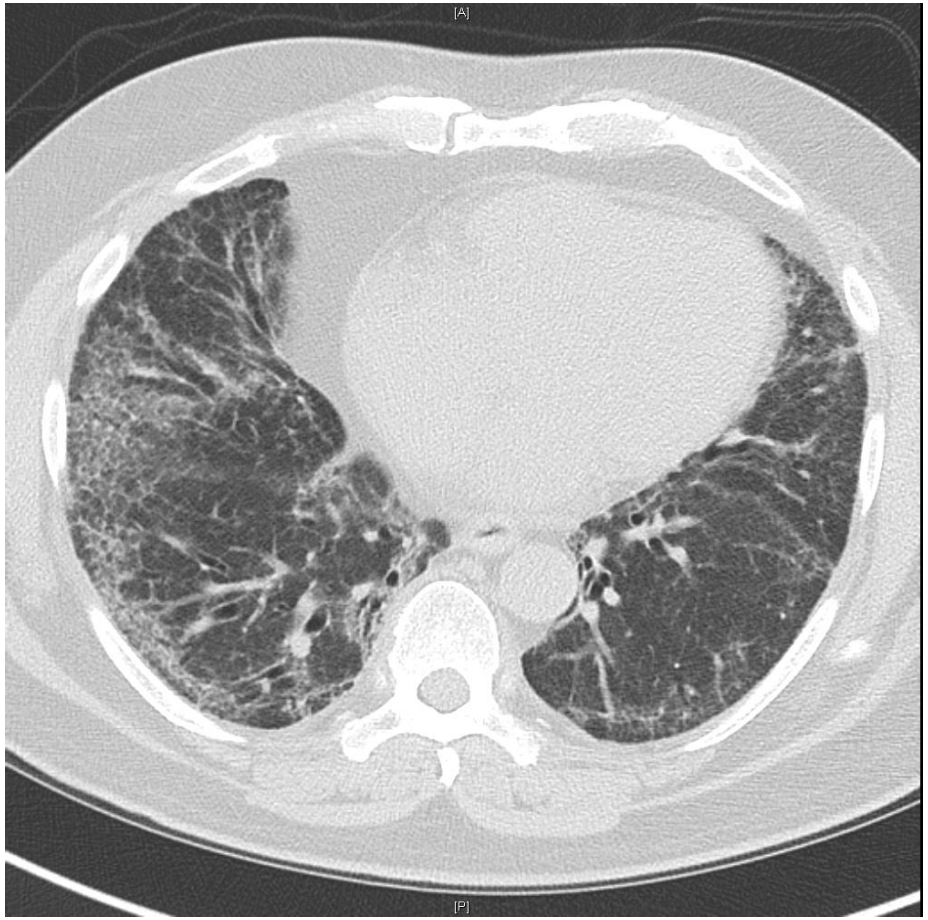
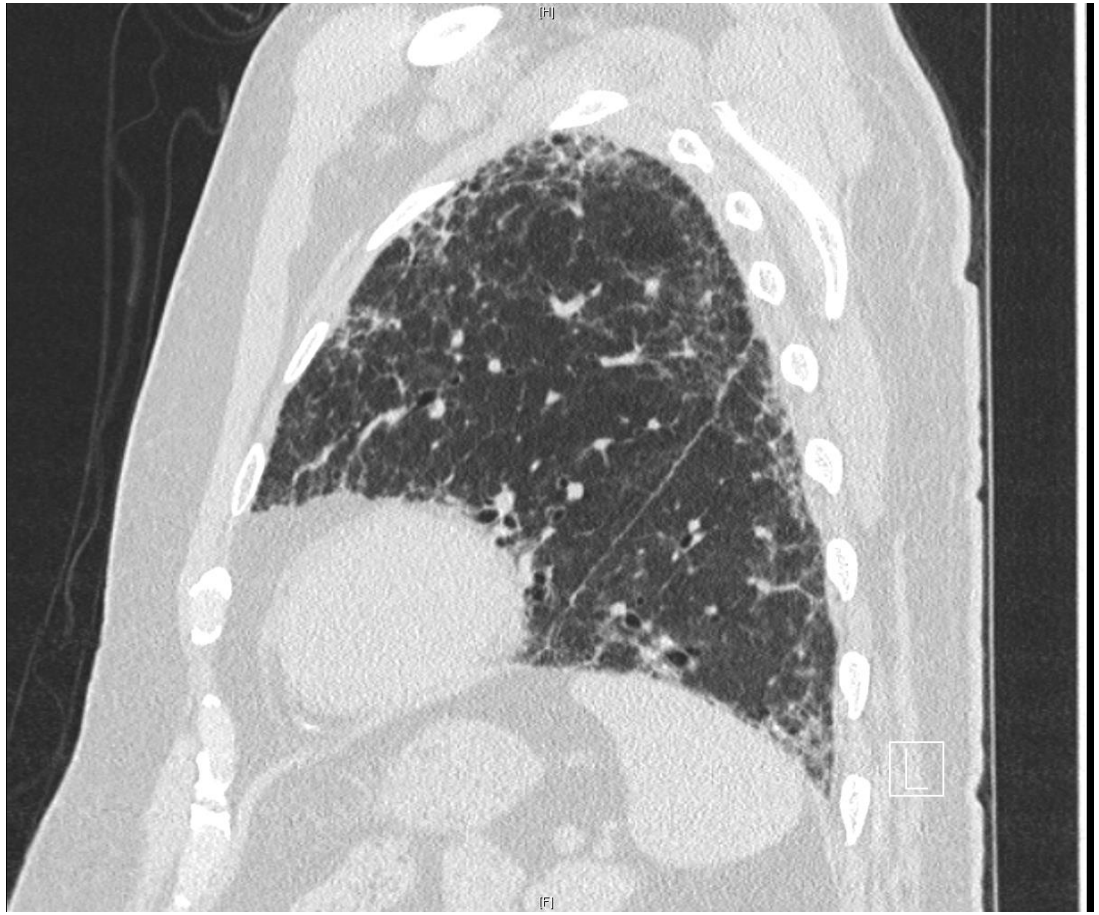




Mr. D.S:

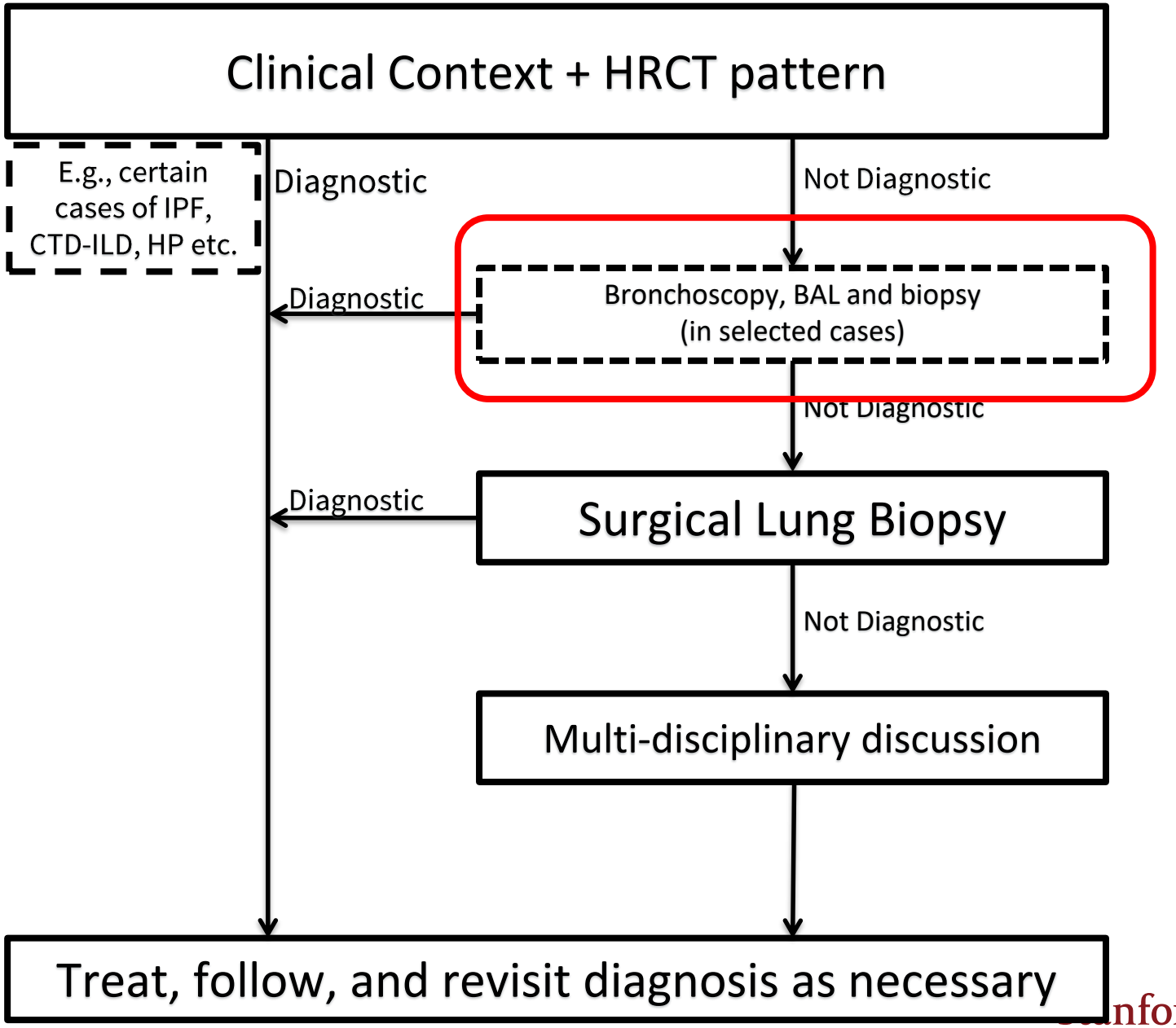
- CT Chest showed an indeterminate UIP pattern
- Not helpful in narrowing the differential diagnosis

Mr. D.S: Working Diagnostic Considerations

- Idiopathic Pulmonary Fibrosis
- Chronic Hypersensitivity Pneumonitis
- Rheumatoid Arthritis Associated Connective Tissue Disease

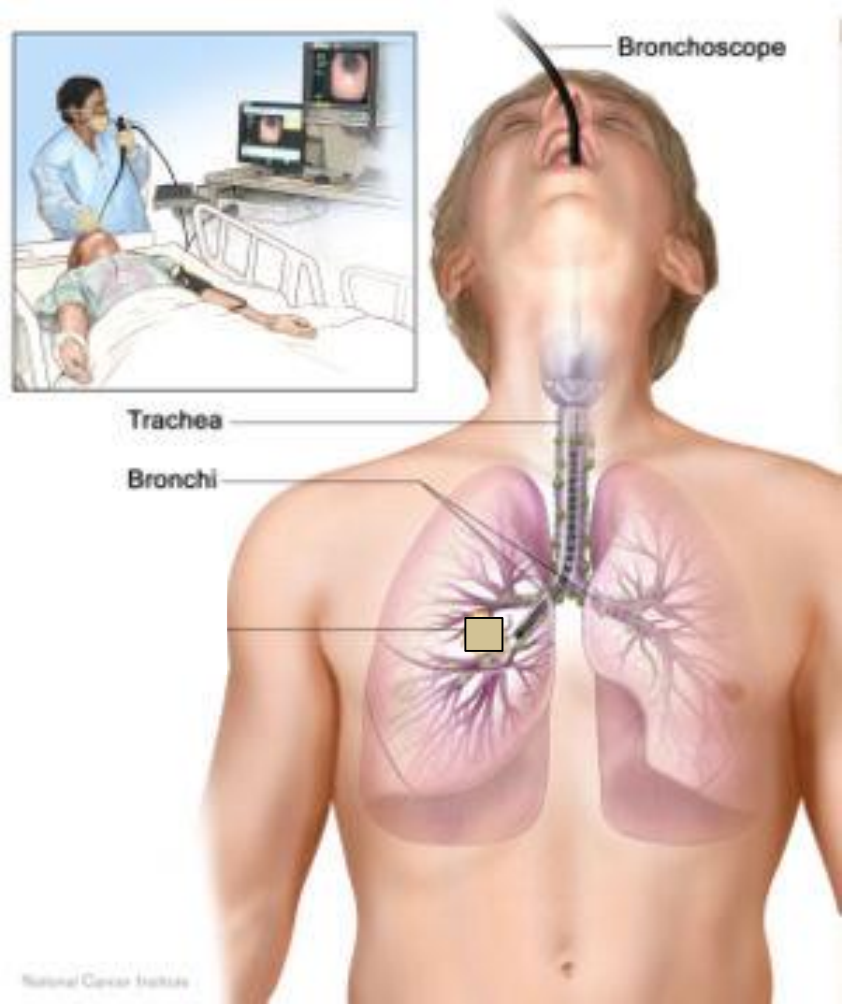
Mr. D.S:

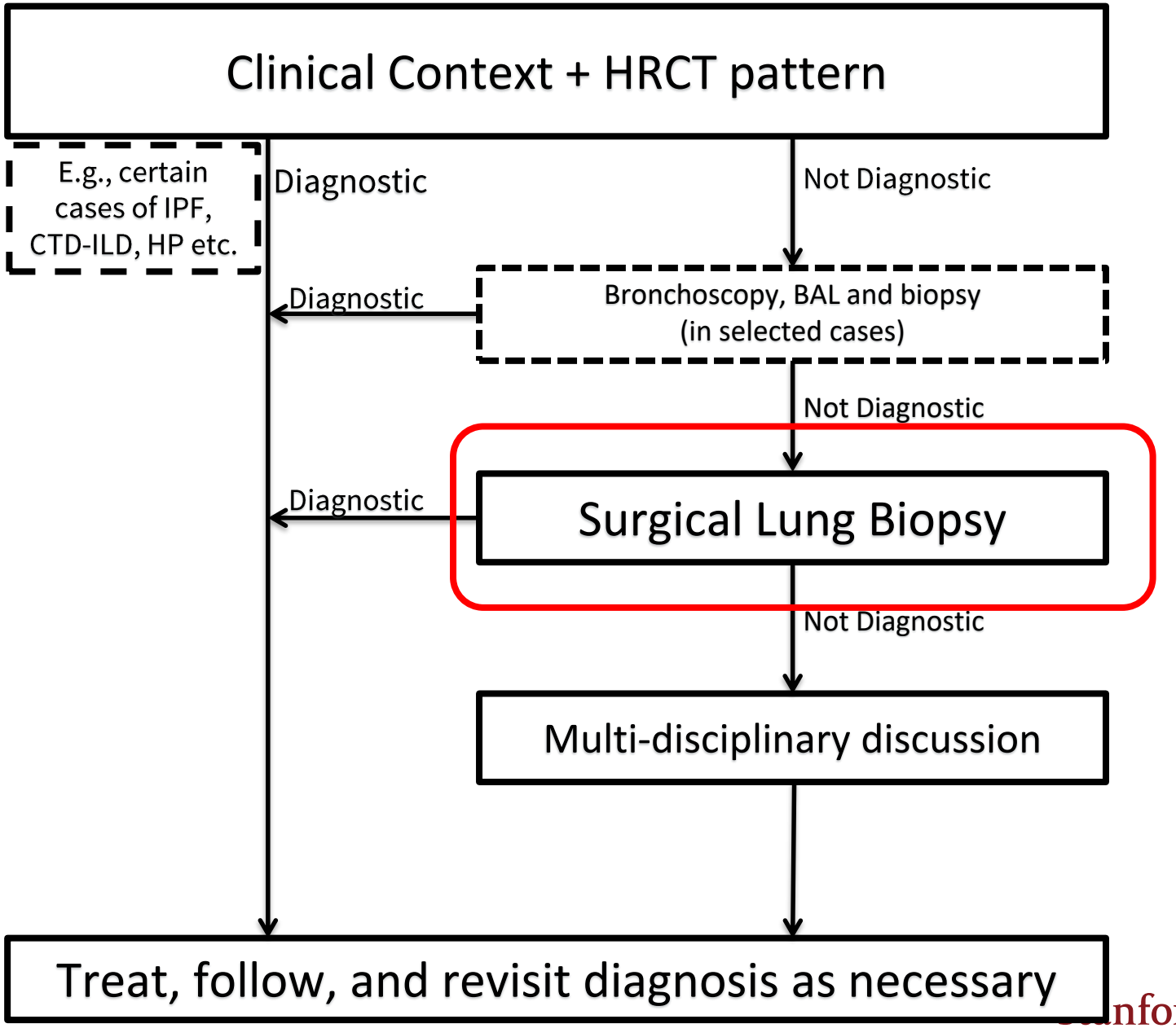
- Referred to rheumatology
- The patient did not meet criteria for connective tissue disease and rheum recommended to diagnose and treat the ILD as if it was not related to a connective tissue disease



Raj et al. Chest 2016

Bronchoscopy, lavage and biopsy





Raj et al. Chest 2016

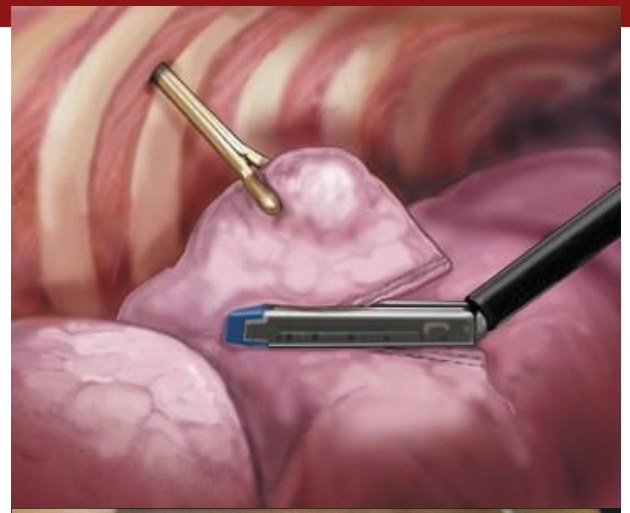
Surgical Lung Biopsy

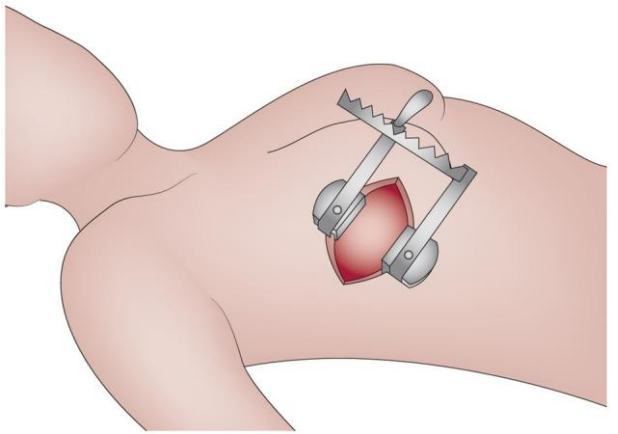
Thoracoscopic (VATS) Lung Biopsy

- 3 incisions (5-10 mm)
- Access to all aspect of the chest
- Favored approach if patients will tolerate anesthesia

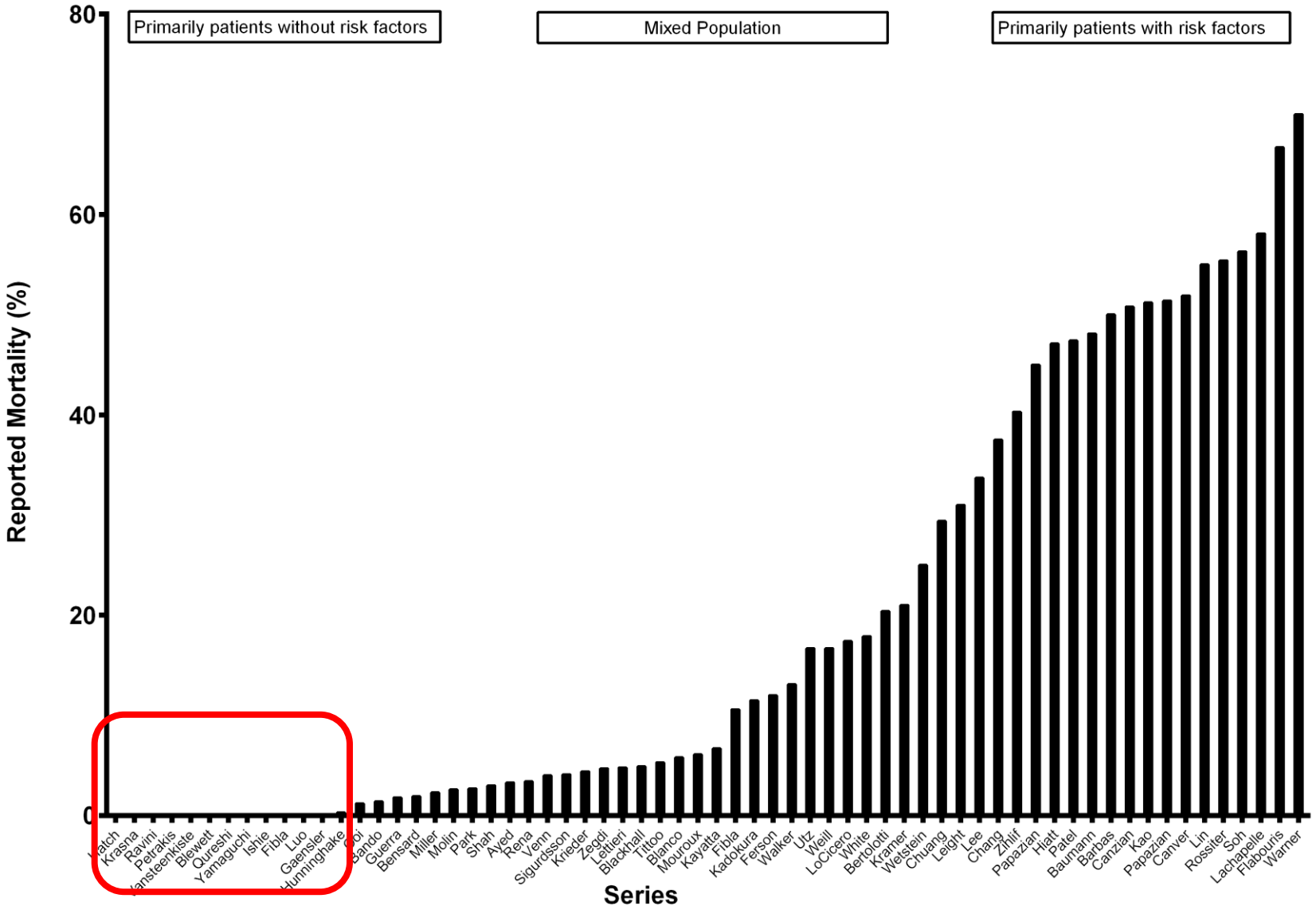
Postoperative Care

- Chest tube in place (overnight
- Majority are home in 1-2 days (>90% in our practice)
- Primary concern is air leak





Mortality following surgical lung biopsy



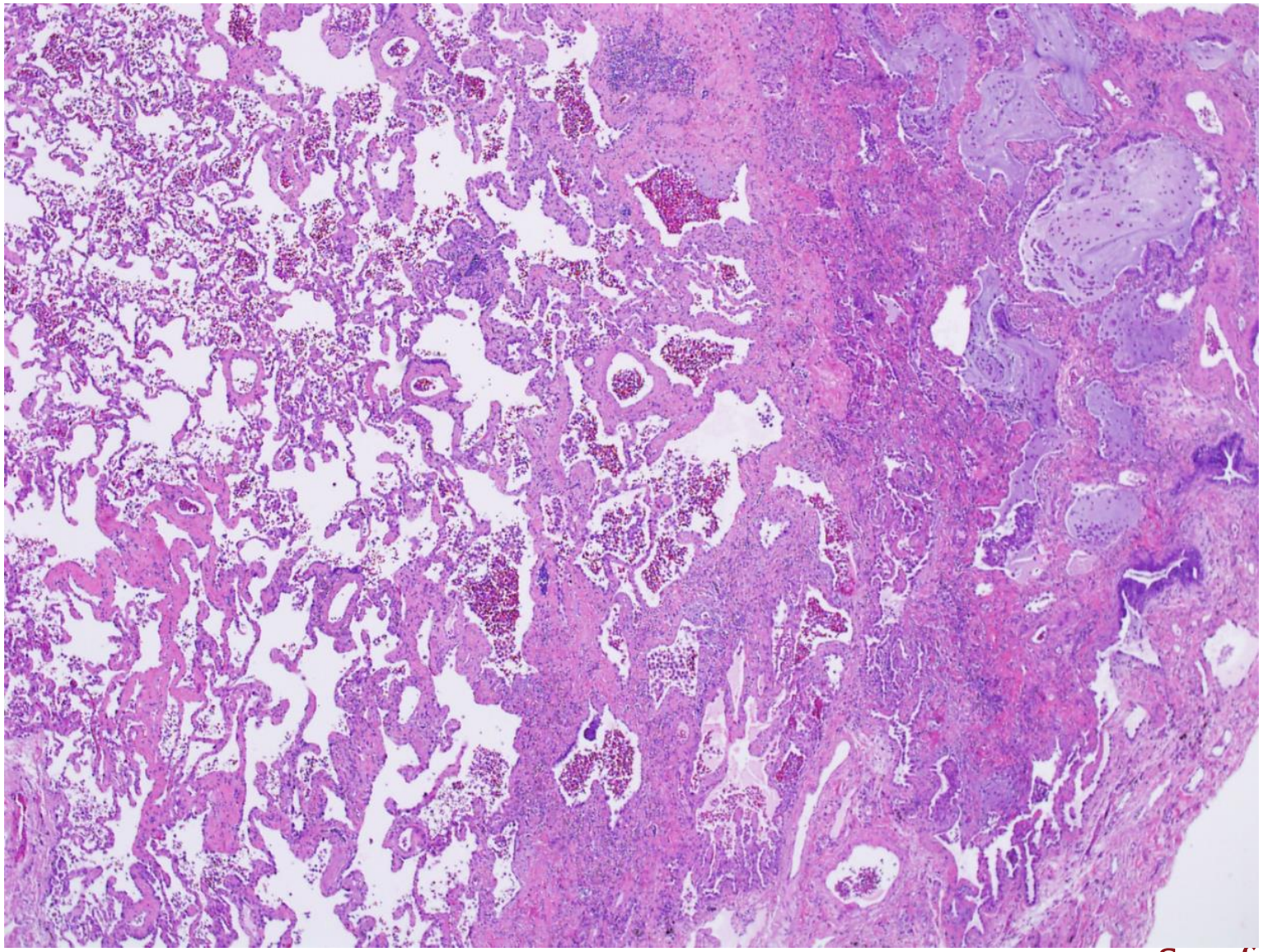
Raj et al. Chest 2016

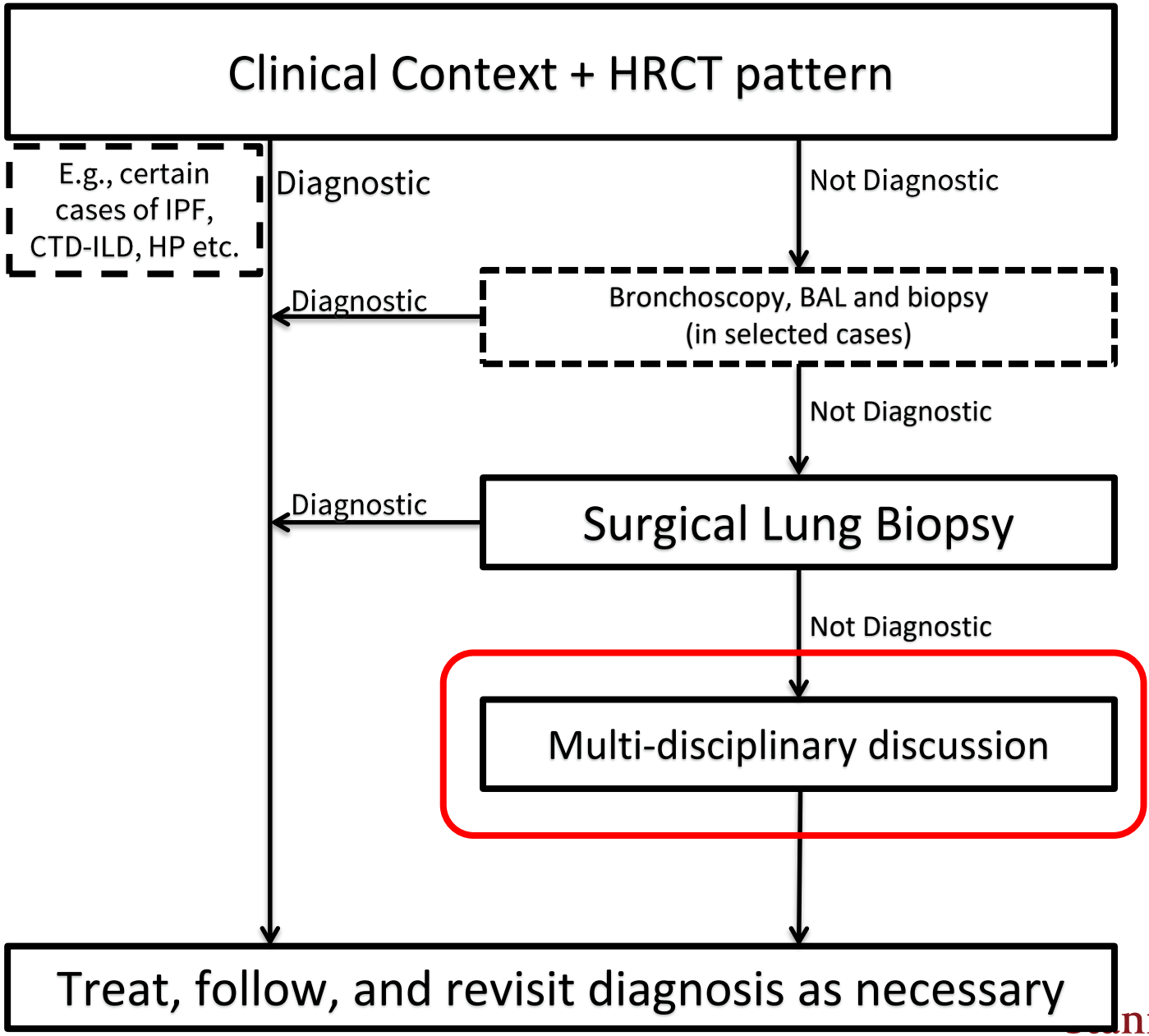
Stanford University

Mr. D.S:

- Referred for a surgical lung biopsy (VATS)
- Uneventful procedure and recovery

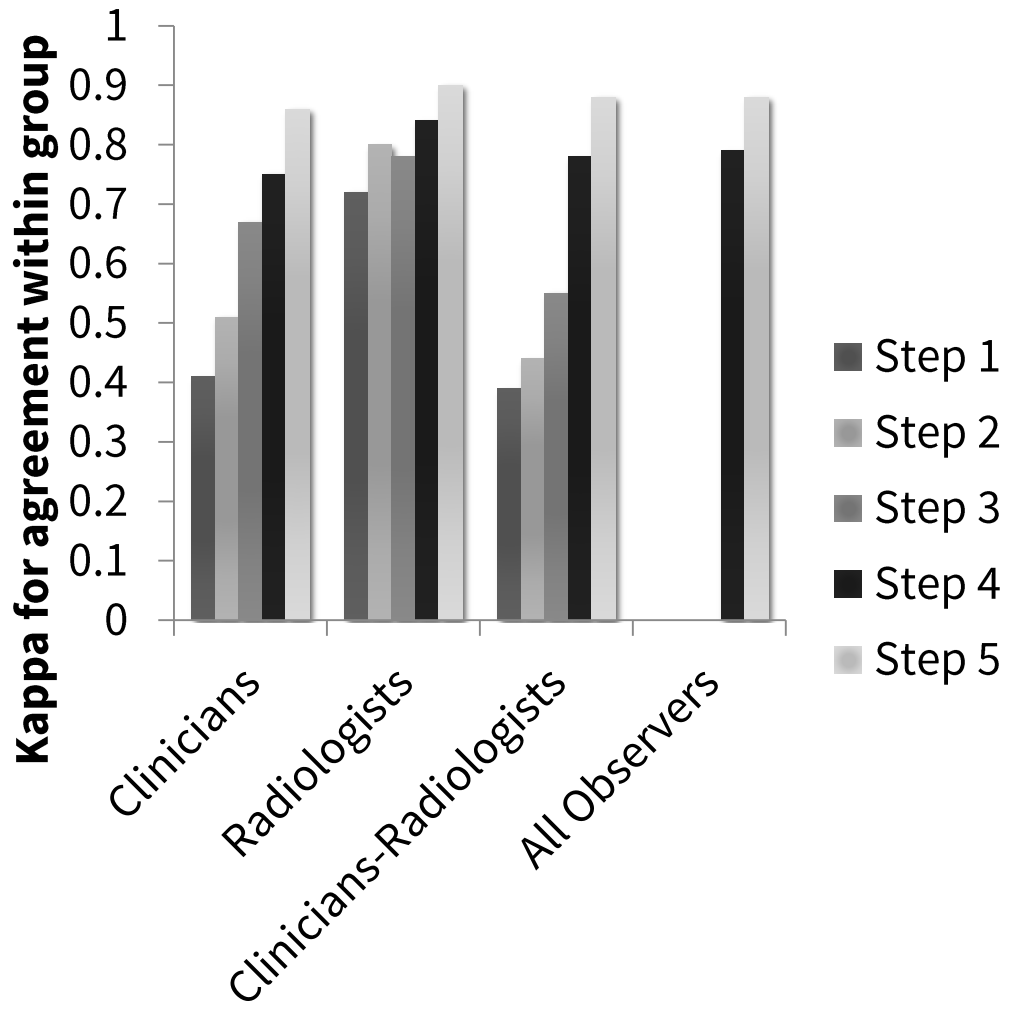
Mr. D.S: Surgical Lung Biopsy





Raj et al. Chest 2016

Agreement on the final diagnosis increases with multidisciplinary discussion



91 ILD PATIENTS

STEP 1

- Expert clinicians and radiologists independently reviewed HRCT
- Opinion: Definite, probable, possible and not UIP

STEP 2

- Clinicians and radiologists reviewed HRCT with clinical information
- No discussion between participants

STEP 3

- Clinician and radiology conference; discussed results with each other

STEP 4

- Conference: Clinicians, radiologists and pathologists discussing cases and their diagnoses

STEP 5

- All discussants tried to reach a consensus diagnosis

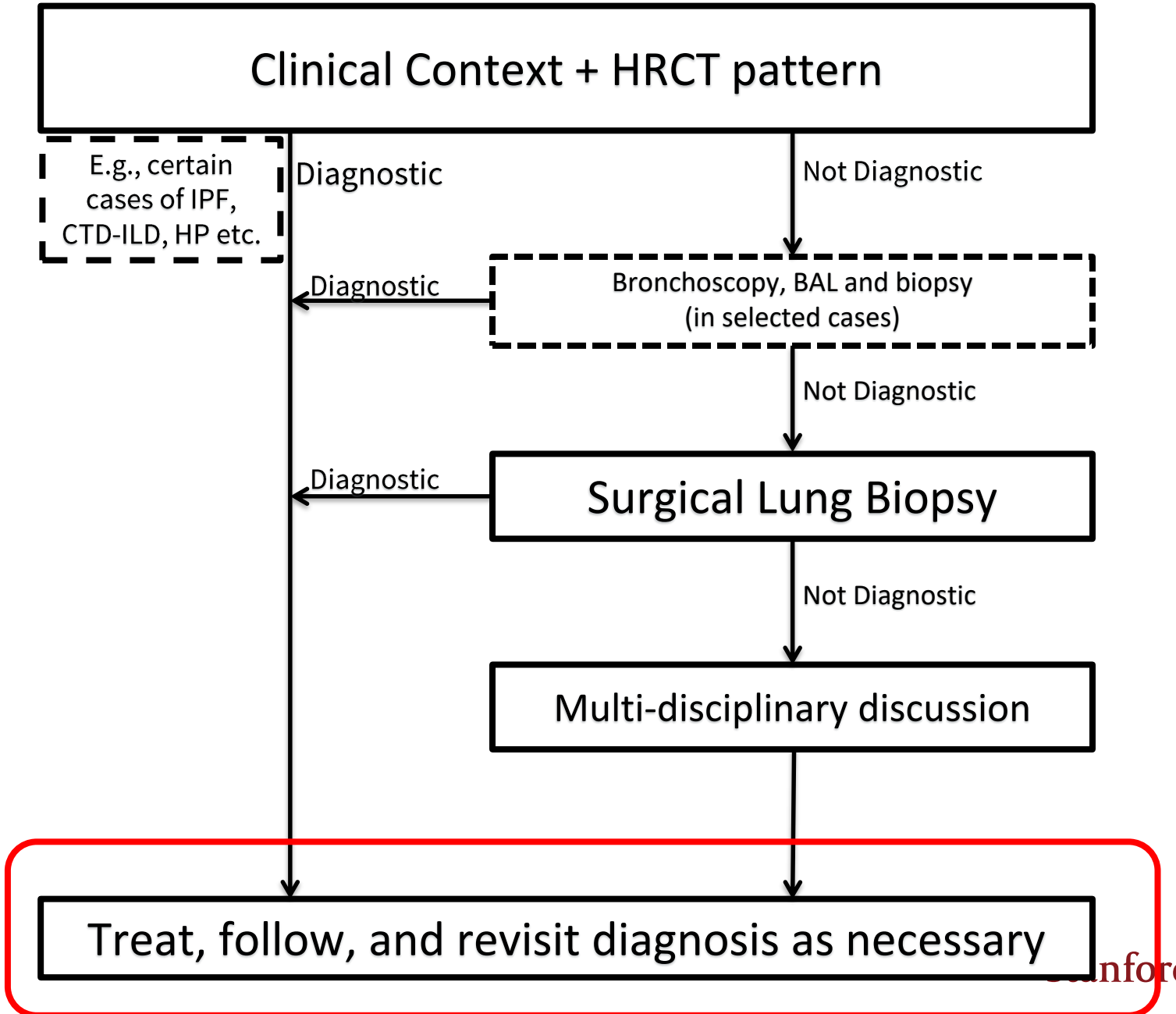
Flaherty et al. AJRCCM 2004

Stanford Multidisciplinary Interstitial Lung Disease Conference

- Pulmonary Medicine
- Thoracic Radiology
- Pulmonary Pathology
- Rheumatology
- Lung Transplant
- Thoracic Surgery
- Clinical Research

Mr. D.S: Final Diagnosis

CONSENSUS MULTIDISCIPLINARY DIAGNOSIS: IDIOPATHIC PULMONARY FIBROSIS



Raj et al. Chest 2016

Mr. D.S: Clinical Course

- Started on Anti-Fibrotic Medications
- Tolerated well except for mild and manageable symptoms

Mr. D.S: Clinical Course

Qualified for, and enrolled in a trial for novel therapeutic agent for Idiopathic Pulmonary Fibrosis

Mr. D.S: Clinical Course

- Stable for 3 years, and then progressed clinically
- Received a double lung transplant and doing well 1 year postoperatively

Questions